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# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 1983

# HEARINGS

BEFORE A

SUBCOMMITTEE OF THE
COMMITTEE ON APPROPRIATIONS
UNITED STATES SENATE
NINETY-SEVENTH CONGRESS
SECOND SESSION

ON

## H.R. 7145

AN ACT MAKING APPROPRIATIONS FOR ENERGY AND WATER DEVELOPMENT FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1983, AND FOR OTHER PURPOSES

**PART 2 (Pages 645–1287)**

**DEPARTMENT OF ENERGY**

Printed for the use of the Committee on Appropriations

U.S. GOVERNMENT PRINTING OFFICE
13-795 O WASHINGTON : 1983

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

9181-4

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# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 1983

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TUESDAY, MARCH 2, 1982

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
*Washington, D.C.*

The subcommittee met at 2:06 p.m. in room S–128, the Capitol, Hon. Mark O. Hatfield (chairman) presiding.

Present: Senators Hatfield and Mattingly.

## DEPARTMENT OF ENERGY

### FEDERAL POWER MARKETING ADMINISTRATIONS

### OPENING REMARKS

Chairman HATFIELD. The meeting will come to order.

The purpose of our hearing today is to receive testimony from the five Federal Power Marketing Administrations which are within the jurisdiction of the Energy and Water Development Subcommittee.

We extend a welcome to the Administrators of these agencies and look forward to receiving your status reports and reviewing your fiscal year 1983 budget requests.

Also, we welcome Joseph J. Tribble, Assistant Secretary for Conservation and Renewable Energy, and Dr. Daniel Ogden, Jr., Director of the Office of Power Marketing Coordination, as our first witnesses today.

I believe this is an historic first, Mr. Secretary. I believe this is the first time since I have been a member of this committee that the Assistant Secretary has appeared to give testimony. We give you a special welcome on a precedent-breaking occasion.

I would like to reaffirm the subcommittee's traditional view relative to the power marketing agencies. It is still our view that Congress established these entities as independent agencies and we hold the Administrators responsible for carrying out their programs in a businesslike manner.

We expect the Department of Energy to assist and coordinate the activities, but not centrally direct or manage.

Bonneville, in particular, is unique. Since 1974, the Bonneville Power Administration has been operated on a self-financing basis. It does not require any appropriations, but comes before the subcommittee for budget review.

One year ago, Congress enacted legislation which greatly expanded Bonneville's responsibilities.

In light of this action, it is crucial that we carefully review its budget requests and make sure that adequate resources are available to implement their new responsibilities.

I refer specifically to the Northwest energy bill that presented Bonneville with these additional duties and functions.

Secretary Tribble and Dr. Ogden, these comments are not directed to you personally. Over the years, the relative independence of these agencies has been emphasized on many occasions by this committee and we want to strengthen that relationship, regardless of whether the Department of Energy has coordinating responsibilities.

We will receive your testimony first, Secretary Tribble, and then proceed with the Administrators of the Bonneville Power Administration, WAPA, Southwestern, Southeastern, and Alaska.

By the way, Secretary Tribble, I believe we have a date sometime in the very near future, next month, if I am not mistaken, to discuss what is left of the solar and renewable energy budget.

Mr. TRIBBLE. That's right.

Chairman HATFIELD. I received the Solar Man of the Year Award yesterday, and I have to prove my validity of that in the coming years, so I just want to put you on notice.

I don't want them to come back and ask me for a return of their reward. It is rather attractive and I would like to keep it on my shelf.

We are most delighted to welcome you here in this historic meeting for the Assistant Secretary to appear. We have your full testimony. We will place it in the record as you have presented it.

You may proceed to highlight or summarize it as you wish.

## STATEMENT OF JOSEPH J. TRIBBLE, ASSISTANT SECRETARY, CONSERVATION AND RENEWABLE ENERGY

## ACCOMPANIED BY DANIEL M. OGDEN, DIRECTOR, OFFICE OF POWER MARKETING COORDINATION

### INTRODUCTION OF WITNESSES

Mr. TRIBBLE. Thank you very much, Mr. Chairman.

I merely want to introduce the team here today. I am very proud of them.

Robert J. Cross, the Administrator of the Alaska Power Administration; I believe you know this fellow on my left, Dr. Ogden.

Chairman HATFIELD. Dr. Ogden, Mr. Cross as well.

Mr. TRIBBLE. On my right, Peter Johnson, Administrator of Bonneville Power Administration.

Chairman HATFIELD. Who is that? [Laughter.]

Mr. TRIBBLE. I know you don't have anything to do with the Bonneville Power Administration. You can either blame or congratulate him. He deserves congratulations.

Then Mr. Robert L. McPhail, Administrator of the Western Area Power Administration; Mr. Richard B. Risk, Administrator of the Southwestern Power Administration; and Harry C. Geisinger, Administrator of the Southeastern Power Administration.

Chairman HATFIELD. We welcome each of you.

Mr. TRIBBLE. The two gentlemen on the far right, Mr. Risk and Mr. Geisinger, are new to the committee this year. Mr. Risk served in the U.S. Air Force from 1963 through 1977, then became a senior public relations representative for the Getty Refining & Marketing Co. in Tulsa. Later, and until this appointment, he was manager of nuclear information for the Public Service Co. of Oklahoma.

Mr. Geisinger had served in the U.S. Navy from 1953 to 1957 and worked in communications for Neisler Laboratories. He then served as a member of the Georgia House of Representatives from 1968 to 1974, and since then has been the owner and president of several businesses.

We consider these operations to be highly successful. In fiscal year 1981, the Power Marketing Administrations sold 133 billion kilowatt-hours and expect to sell 134 billion kilowatt-hours in fiscal 1982.

Gross revenues in fiscal 1981 were $1.3 billion and are expected to increase to $2.3 billion in 1982 and $2.9 billion in fiscal 1983.

The fiscal 1983 budget request will allow us to continue this service in an efficient and businesslike manner. Our total request for fiscal 1983 of $256,647,000 does not include Bonneville's budget which will be financed from the power revenues and sale of bonds to the Treasury.

Bonneville's budget for fiscal 1983 has net outlays of $265 million and contains a request for $1.25 billion in borrowing authority pursuant to the Pacific Northwest Electric Power Planning and Conservation Act.

That concludes a synopsis of my testimony, Mr. Chairman. I will certainly be available to respond to questions either now or later.

[The statement and biographical sketch follow:]

### STATEMENT OF JOSEPH J. TRIBBLE

Mr. Chairman and members of the committee, I am Joseph J. Tribble, Assistant Secretary for Conservation and Renewable Energy in the Department of Energy.

With me today are the Administrators of the four Power Administrations which require appropriations. They are: Robert J. Cross, Administrator, Alaska Power Administration; Harry C. Geisinger, Administrator, Southeastern Power Administration; Richard B. Risk, Administrator, Southwestern Power Administration; and Robert L. McPhail, Administrator, Western Area Power Administration. Peter T. Johnson, Administrator, Bonneville Power Administration, is also here today. As you know, Bonneville does not require appropriations but they do report to the committee for oversight purposes. Also here with me today is Dr. Daniel M. Ogden, Jr., Director of the Office of Power Marketing Coordination. As you know, Dr. Ogden's Office serves as the coordinator for common activities and the needs of all five Power Administrators and as staff to me on power marketing matters.

Mr. Chairman, I would like to take a minute to introduce Messrs. Risk and Geisinger to the members of the committee. These two gentlemen have recently been appointed to their positions and are appearing before this committee for the first time.

Mr. Risk served in the U.S. Air Force from 1963 to 1977, then became senior public relations representative for the Getty Refining & Marketing Co. in Tulsa, and was, until this appointment, manager of nuclear information for the Public Service Co. of Oklahoma. During this period he was granted leave of absence from the Public Service

Co. to become executive director of Oklahomans for Energy and Jobs, a nonprofit, pro-energy advocacy citizens group.

Mr. Geisinger served in the U.S. Navy from 1953 to 1957, and then worked in communications and for Neisler Laboratories, a subsidiary of Union Carbide. He then served as a member of the Georgia House of Representatives from 1968 to 1974. Since 1974, he has been owner and president of several businesses.

We are pleased to have these able and experienced individuals with us at the Department of Energy.

We are appearing before the committee today to seek authorization for appropriations to operate and maintain the four Power Administrations.

As you know, legislation which governs the functions of our power marketing administrations establishes that:

First, the Federal Government builds and operates multipurpose dams and generates electricity where it is economically and environmentally justified.

Second, the Federal Government transmits its electric power over its own high-voltage transmission lines and sells the power wholesale to distribution utilities and certain large power users.

Third, the Corps of Engineers and the Bureau of Reclamation operate the dams and generate the electricity. All of the Power Marketing Administrations, except Southeastern, transmit and sell the power. The Southeastern Power Administration owns no transmission lines and depends on public utilities to wheel the power.

Fourth, in selling power the Power Marketing Administrations, according to law, give preference to publicly and cooperatively owned distribution systems. In the Bonneville service area, these preference benefits have been extended to the residential and small farm customers of investor-owned utilities.

Fifth, the Power Marketing Administrations can sell power at uniform rates within their marketing areas.

We considered these to be highly successful. In fiscal year 1981, the five Power Marketing Administrations sold 133 billion kilowatt-hours, and expect to sell 134 billion kilowatt-hours in fiscal year 1982. Gross revenues from those sales were $1.3 billion in fiscal year 1981 and are expected to increase to $2.3 billion in fiscal year 1982, and are anticipated to be $2.9 billion in fiscal year 1983. The fiscal year 1983 request allows us to continue this service in an efficient and businesslike manner.

Our total request for fiscal year 1983 of $256,647,000 does not include Bonneville's budget, which will be financed from its power revenues and sales of bonds to the Treasury. Bonneville's budget for fiscal year 1983 has net outlays estimated at $265 million and contains a request for $1.25 billion in borrowing authority pursuant to the Pacific Northwest Electric Power Planning and Conservation Act. This borrowing authority is to finance the multiyear conservation and renewable resource programs required under the act.

Mr. Chairman, that concludes my testimony. Dr. Ogden will provide an overview of the power marketing program and the Administrators will provide specific details of the activities and proposed budgets for their administrations. If you have any questions for me, I will be pleased to respond.

---

## BIOGRAPHICAL SKETCH

Joseph J. Tribble was confirmed Assistant Secretary for Conservation and Renewable Energy, U.S. Department of Energy, on May 14, 1981.

Prior to his current appointment, Mr. Tribble was energy coordinator for the unbleached division of Union Camp Corp. In that position, he was responsible for energy management for the firm's unbleached paper mills in Montgomery, Ala.; Monroe, Mich.; and in Savannah, Ga. He previously held positions as assistant powerplant superintendent and powerplant superintendent, in the Savannah Mill which has the largest and most complex powerplant in the industry and where several pioneering steps have been taken in energy utilization.

The primary objective of the corporation's energy management program, to reduce the consumption of fossil fuels, has been achieved most notably at the Savannah plant, where fuel use per unit of production was reduced by 40 percent between 1972 and 1980. The overall success of the firm's energy management program has been attributed to a combination of measures, including increased use of energy-saving equipment and increasing the amount of wood waste in the total fuel mix.

Mr. Tribble received a B.S. degree in mechanical engineering from Georgia Institute of Technology in 1942. From February 1942 to August 1943, he was with Bethlehem Steel Co., Bethlehem, Pa. He served with the U.S. Maritime Service from 1943 to 1946.

Mr. Tribble has been an active leader in the Republican Party since 1960, serving one term as State chairman of the Republican Party of Georgia and two terms as State senator (the first Republican State senator from southeast Georgia in this century). He was a delegate, member of the platform committee, and member of the energy subcommittee of the Republican National Conventions of 1976 and 1980. He was chairman of the 1980 Reagan for President campaign in the First Congressional District of Georgia.

A native of Forsyth, Ga., Mr. Tribble is married to the former Laura Boddiford of Sylvania, Ga. They have four children. At the time of his appointment, he was serving as chairman of the administration board of the Wesley Monumental United Methodist Church in Savannah.

## REGION X WOOD-DERIVED FUEL PROGRAM

Chairman HATFIELD. Thank you very much, Mr. Secretary. I have one brief question which relates to Mr. Johnson and BPA. As you know, Public Law 97-88, the Energy and Water Development Appropriations Bill for fiscal year 1982 required the transfer of $1.3 million from DOE to BPA for the region 10 wood-derived fuels program.

Mr. TRIBBLE. Right.

Chairman HATFIELD. This funding was to be provided 60 days after enactment of the bill and, therefore, should have been completed by February 4.

My question to both of you is, Has the money been transferred?

Mr. TRIBBLE. Yes; it has been authorized by our Office.

I am sure you should have received it by now.

Mr. JOHNSON. We were notified of this and we have accepted it. We are evaluating it.

Chairman HATFIELD. Thank you very much.

Dr. Ogden?

## STATEMENT OF DR. DANIEL M. OGDEN, JR.

Dr. OGDEN. Mr. Chairman, I ask that my testimony be entered in the record.

Chairman HATFIELD. Yes.

[The statement follows:]

## STATEMENT OF DR. DANIEL M. OGDEN, JR.

I am Daniel M. Ogden, Jr., Director, Office of Power Marketing Coordination, Conservation and Renewable Energy, in the Department of Energy. I am pleased to have this opportunity to appear before you and discuss with you the Federal power marketing programs.

In this statement I will highlight the major functions of the program, objectives for fiscal 1983, problems we have encountered, and the status of our program.

### MAJOR FUNCTIONS OF THE PROGRAM

The five power marketing administrations are responsible for marketing hydroelectric power produced at all Federal multiple-purpose water projects, except in the Tennessee Valley. One power administration, Alaska, also operates and maintains generating stations. To deliver the power to the load centers of their customers, four of the five construct, operate, and maintain high voltage transmission systems. Preference in the sale of power is given to public bodies and cooperatives, as directed by law. Rates charged the customers are set at the lowest possible level consistent with sound business principles and are designed to recover all costs of producing and delivering the power.

To carry out their functions, the power marketing administrations:

- o Enter into contracts for the sale and purchase of power.
- o Develop rates.
- o Construct transmission lines, substations, switchyards and attendant facilities.
- o Conduct appropriate energy conservation programs.

The power marketing program began in 1906 with enactment of authority for the Secretary of the Interior to install powerplants at Federal reclamation projects.

The major laws which shape the program are the Bonneville Project Act of 1937, the Reclamation Project Act of 1939, the Flood Control Act of 1944, the Federal Columbia Power Transmission System Act of 1974, and the Pacific Northwest Electric Power Planning and Conservation Act of 1980.

In fiscal year 1982, the power administrations will market about 134 billion kilowatthours. Revenues are expected to be $2,933 million in FY 1983, up from $2,303 million in FY 1982, primarily as a result of increases in Bonneville's rates last summer.

## OBJECTIVES FOR FY 1983

The power marketing program has several specific objectives in Fiscal Year 1983:

> First, Bonneville will continue implementing the Pacific Northwest Electric Power Planning and Conservation Act of 1980.
>
> Second, all five power marketing administrations will continue to examine and adjust rates to insure that they are meeting repayment criteria as provided by law.
>
> Third, the Office of Power Marketing Coordination will cooperate closely with the Corps of Engineers and the Bureau of Reclamation to exchange information, improve procedures, and provide technical assistance for the development of additional hydroelectric resources.

Although each of the administrators is here today to explain his budget requests for FY 1983 to you in more detail, I wish to highlight several aspects for you.

BUDGET HIGHLIGHTS

The budget for the Alaska Power Administration is $2.8 million. This reflects an overall decrease of $729,000 from FY 1982 appropriations. The General Investigations program of the Alaska Power Administration, which studies hydroelectric development potential in Alaska, has been eliminated. We believe that the State has sufficient resources to conduct such studies without further Federal subsidies.

Western's overall budget has also decreased but only slightly, from $211 million to $208 million. However, the purchase power account has been decreased by 13 percent from $53 million to $46 million as a result of the expiration of Western's contract to purchase capacity and energy from the Centralia steam electric plant in the state of Washington to meet contract commitments in the Central Valley of California. Western can purchase energy "banked" years ago with Pacific Gas and Electric Company at a price of 2.8105 mills per kilowatthour to replace energy it had been buying from the Centralia plant. The Centralia contract cannot be renewed. Western could have sought other energy at the best price it could obtain, but all available power would have been much more expensive. We have elected to draw down "Bank Account Number 1" in fiscal year 1983 to hold down the cost of purchased power. Because this power is less expensive than the Centralia power, it was possible to reduce the Western purchase power appropriation for FY 1983.

The increase of $4,611,000 over the FY 1982 appropriation for the Southeastern Power Administration is to pay investor owned utilities for transmission services as part of the ongoing plan to market all available capacity to preference customers.

A major share of the Southwestern Power Administration's increase of $13,021,000 from $21,269,000 to $34,290,000 is for the purchase of thermal energy to supplement available hydro energy in order to meet specific contractual commitments.

## RATE ADJUSTMENT ACTIONS

For the last three years, we have been engaged in a major effort to ensure that all five of the power administrations are collecting sufficient revenues to recover all costs of producing and marketing power. In December 1978, the Secretary of Energy signed a delegation order creating a new system for the establishment and review of power marketing rates. The new system was designed to secure prompt action on rate proposals. He delegated to the Assistant Secretary responsible for power marketing, the authority to establish rates and to place them into effect on an interim basis. At the same time, he delegated to the Federal Energy Regulatory Commission (FERC), the authority to confirm and approve power administration rates on a final basis. Congress modified the procedures for the Bonneville Power Administration in enacting the Pacific Northwest Electric Power Planning and Conservation Act of 1980, providing that after December 5, 1981, FERC has authority to grant interim approval as well as final confirmation and approval of Bonneville rates

Since March 1, 1979, the Assistant Secretaries have issued twenty-six rate actions which have been submitted to the FERC for final confirmation and approval. All five power administrations have therefore adjusted their rates to reflect the higher costs of production and marketing. The FERC has confirmed and approved sixteen of these rate actions, including six which were merely extensions of existing rates approved earlier by FERC. Ten rate actions, including one extension, are still pending before FERC. I am submitting a table listing these rate actions and indicating the length of time each action was before FERC. The length of time for completed actions has varied from as short as five months to as long as 34 months. Of the pending cases, one has now been before FERC for 33 months, one for 28 months, and one for 26 months. Bonneville has never had a rate adjustment approved by FERC and has now pancaked its Systemwide rate adjustments, having submitted a first Systemwide rate adjustment on December 3, 1979, and a second

Systemwide adjustment on June 24, 1981. A third Systemwide Bonneville rate adjustment is scheduled for the Fall of 1982. Western also has experienced discouraging delays. Of five rate adjustments, only one has been confirmed and approved by FERC.

We now expect the power administrations to submit eight additional rate actions to the Assistant Secretary during FY 1982, and two others in the first quarter of FY 1983.

We had several meetings with the FERC staff to expedite action on pending cases. Recently we have instituted pre-submission discussions to enable the FERC staff to ask questions, obtain additional information, and clarify the staff's needs for information and documentation supporting the rate filings. FERC itself has taken steps to expedite the handling of non-controversial rate adjustments by delegating the authority to act upon them. Most of the pending cases, however, are controversial and do not lend themselves to abbreviated procedures.

## STATUS OF PROGRAM

All five of the power administrations have made substantial efforts to involve the public in reaching their important decisions on power allocations, rate adjustments, and service extensions. Because of their existing facilities and effective organizations, the power administrations are available to assist the Nation in its efforts to develop new domestic sources of electric energy.

Our power marketing program is proceeding smoothly and on schedule. The power administrations are actively working to maximize their energy production, maintain a high degree of system reliability, and construct needed transmission lines and interties to provide flexibility to meet demands in the movement of electric power.

This concludes my statement, Mr. Chairman and Members of the Committee. I will be happy to answer any questions you may have.

### TABLE 1

### OFFICE OF POWER MARKETING COORDINATION SUMMARY STATUS ON POWER RATE ACTIONS FERC APPROVALS--FEBRUARY 1, 1982

| PMA (No.) | Project/System | Date to FERC | Date Approved by FERC | Time (Mos.) |
|---|---|---|---|---|
| APA-1 | Snettisham (Ext.) | 03/09/79 | 12/02/80 | 21 |
| APA-2 | Eklutna | 12/04/79 | 08/03/81 | 20 |
| SEPA-1 | Laurel (Ext.) | 03/01/79 | 08/14/79 | 5 |
| SEPA-2 | Laurel | 04/10/79 | 10/25/79 | 6 |
| SEPA-3 | Georgia-Alabama (Ext.) | 05/02/79 | 01/22/80 | 9 |
| SEPA-4 | Cumberland | 05/22/79 | 02/27/81 | 21 |
| SEPA-5 | Georgia-Alabama | 08/01/79 | 04/03/81 | 20 |
| SEPA-6 | Jim Woodruff | 08/15/79 | 04/09/81 | 20 |
| SEPA-7 | Kerr-Philpott (Ext.) | 04/22/80 | 01/29/81 | 9 |
| SWPA-1 | Systemwide | 03/01/79 | 01/13/82 | 34 |
| SWPA-2 | Sam Rayburn | 04/12/79 | 01/08/81 | 21 |
| SWPA-3 | Transmission (Ext.) | 06/18/79 | 12/02/80 | 18 |
| SWPA-5 | Narrows (Ext.) | 06/06/80 | 01/02/81 | 6 |
| SWPA-7 | Transmission | 12/11/80 | 07/31/81 | 8 |
| WAPA-3 | Parker-Davis | 05/15/80 | 10/29/81 | 17 |
| BPA-3 | Coordination Agreement | 06/01/80 | 07/01/80 | 1 |

### TABLE 2

### OFFICE OF POWER MARKETING COORDINATION POWER RATE ACTIONS STILL PENDING BEFORE FERC FEBRUARY 1, 1982

| PMA (No.) | Project/System | Date to FERC | Time (Mos.) |
|---|---|---|---|
| BPA-1 | Transmission (Ext.) | 05/14/79 | 33 |
| BPA-2 | Systemwide | 12/03/79 | 26 |
| BPA-4 | Systemwide | 06/24/81 | 7 |
| BPA-5 | Transmission | 06/24/81 | 1 |
| SEPA-11 | Kerr-Philpott | 09/14/81 | 5 |
| SEPA-12 | Georgia-Alabama (Duke Area) | 12/18/81 | 2 |
| WAPA-2 | Central Valley | 10/02/79 | 28 |
| WAPA-4 | Colorado River Stroage | 12/23/80 | 13 |
| WAPA-8 | Central Valley (Centralia) | 06/19/81 | 7 |
| WAPA-9 | Fryingpan-Arkansas | 07/11/81 | 6 |

## RATE ADJUSTMENTS

Dr. OGDEN. I will quickly summarize it.

I think the one key thing I want to be sure to call to the committee's attention is the effort that has been made in the adjustment of rates over the last 3 years to assure that the five Power Administrations have sufficient revenues to cover all costs of producing and marketing power.

In 1978 the Secretary of Energy, exercising the authority granted him under the Department of Energy Organization Act, provided the Assistant Secretary, responsible for power marketing, the authority to put the rates into effect on an interim basis and then to refer them to the Federal Energy Regulatory Commission, which would confirm and approve them on a final basis. There have been 26 rate adjustment actions which have been submitted to the Federal Energy Regulatory Commission, of which the Federal Energy Regulatory Commission has acted on 16, including 6 extensions. There are 10 pending rate actions on which the Federal Energy Regulatory Commission has not acted. I submitted in the back of my testimony two tables, listing both the approvals and the pending cases.

The thing that concerns us has been the long amount of time that it has taken for the Federal Energy Regulatory Commission to act on a number of these cases.

At the present time, none of the Bonneville rate adjustment actions has been acted upon by the Federal Energy Regulatory Commission. Two systemwide rate adjustments are in the system and Mr. Johnson is contemplating a third rate adjustment during this calendar year.

At the present time, the transmission rate has been pending at the FERC for 54 months and the first systemwide rate 26 months. Previously, the transmission rate was pending at FERC's predecessor, the Federal Power Commission for 12 months.

Western has experienced seriously long delays. The Central Valley rates has been before the FERC for 28 months and we feel we ought to call it to your attention.

We have been working with the Federal Energy Regulatory Commission to try to resolve the problems of delay. We have had a series of meetings with them to clarify staff needs for information and documentation.

FERC itself has taken steps to handle noncontroversial rate adjustments. But the controversial adjustments have remained uncompleted. Mr. Tribble even called on the Chairman of the FERC just recently, and he is confident of a resolution of the matter.

We felt we ought to call your attention to it.

Chairman HATFIELD. We appreciate that very much, Dr. Ogden.

Before we excuse you, Mr. Secretary, and I know you have pressing duties, I would invite Senator Mattingly to ask any questions that he may have.

Senator MATTINGLY. I have no questions at this time, Mr. Chairman. If I have some, I will submit them in writing.

Chairman HATFIELD. You may do as you wish.

Mr. TRIBBLE. Thank you very much.

As you know, or may not know, I have two other hearings this week, so I would appreciate the time to be able to prepare.

Chairman HATFIELD. We are certainly happy that you came. We look forward to seeing you next month when we have the hearing on solar and other reusable energy sources, and if we have any questions that arise out of the discussions with these marketing agencies, we will feel free to get back to you in writing.

Mr. TRIBBLE. Thank you very much.

## BONNEVILLE POWER ADMINISTRATION

### STATEMENT OF PETER T. JOHNSON, ADMINISTRATOR

Chairman HATFIELD. This is also a historic first.

Mr. Johnson, I believe this is the first time for you to appear before our committee. We have heard from a number of your predecessors. We hope to hear from you in a number of years ahead. We are happy to welcome you here today on your first appearance.

I made that remark about the historic significance because Bonneville Power Administrators come and go, but we tend to go on and we are happy to work with you.

Mr. JOHNSON. Thank you, Mr. Chairman.

I feel certain that Bonneville Power will endure as Administrators come and go.

#### PREPARED STATEMENT

I have submitted a prepared statement for the record, but I have some comments that I want to make.

[The statement follows:]

# STATEMENT OF PETER T. JOHNSON

Thank you for this opportunity to present to you Bonneville Power Administration's (BPA) budget for fiscal year 1983.

## INTRODUCTION

For FY 1983, BPA's proposed budget obligations are estimated to increase to $2.6 billion from $1.7 billion, an increase of $857 million. Total outlays are expected to increase over FY 1982 by $869 million, a very similar amount. These large increases are based on BPA's old and new statutory responsibilities related to the acquisition, management, and transmission of power, which I will discuss in detail, as well as some important regional circumstances which I will point out to this Committee.

## CHANGING ECONOMIC CONDITIONS

The national recession is having an impact in the Pacific Northwest which is resulting in curtailed primary aluminum production as well as reduced production in most other industrial sectors. It has lowered regional industrial loads generally and BPA's direct-service industrial customers have also sharply lowered their power requirements. The forest products industry is now starting its third year of reduced production and high unemployment resulting from high mortgage rates and curtailed national housing demand. Residential consumption of electricity, too, has declined recently as a result of several factors, including lower personal incomes and higher electricity prices, as well as conservation programs sponsored by BPA, regional utilities, and state and local governments. As a result of all these factors, electrical demand is running substantially below regional forecasts, and BPA is experiencing a serious revenue shortfall.

Revenue shortfalls, and the reductions in cash flow which result, are affecting many parts of our program. We have had to make many difficult choices as we made our decisions on this budget proposal. We have attempted to use reasoned judgment in making our decisions, and we have consulted widely with all of our customers. Our budget proposal for FY 1983 and our 1982 rate increases represent what we believe is the best possible power program for meeting the collective needs of the region in these difficult circumstances.

## SUPPLY SYSTEM ISSUES

The region's utility industry is also dealing with issues associated with the Washington Public Power Supply System's nuclear construction program. The Supply System is presently constructing three nuclear generating projects in the State of Washington. BPA has contracted for all the generating capability of two of these projects and 70 percent of the third. Under these contracts, BPA has agreed to pay the annual costs of these projects, including debt service on the bonds issued to finance construction.

The Supply System Board of Directors recently decided to terminate construction of two additional nuclear plants in which Bonneville has no involvement. This action will cost the owners of these plants--88 public utilities and Pacific Power & Light Company (which owns 10 percent)--approximately $3 billion plus interest. We are encouraged by the fact that the owners of the plants have agreed to fund an orderly termination of construction. This will minimize the impact of termihation of these plants on the Supply System's ability to continue construction of the three remaining plants.

BPA's expenses associated with financing the three projects from which we will acquire the capability have increased under the pressure of escalating project construction costs and higher interest rates. However, we are encouraged by the fact that construction costs have stabilized and schedules are being met. Because Bonneville is obligated currently to pay debt service on the bonds sold to finance construction of Projects 1 and 2, and will be obligated to begin paying debt service for bonds on Project 3 in late FY 1982, these costs are directly impacting both BPA's rates and our budget. Up to 75 percent of our next rate increase to preference customers will be required to pay for the debt service on these projects.

This direct relationship between the expense of these thermal plants and BPA's rates means that we must act prudently and decisively to help control the cost of these projects. We have encouraged the Supply System to reduce the construction cash requirements of the three plants during the remaining construction period by 15 percent. The Supply System is committed to investigate all practical means of achieving this goal, while maintaining the present schedules, safety, and quality of the projects. Both Bonneville and the Supply System are commited to establishing and maintaining fiscal control as construction of the plants continues toward completion. It is actions such as this that will preserve and enhance our credit worthiness in all financial markets.

## BPA'S RESPONSE: FISCAL INTEGRITY

BPA has responded to changing economic conditions, to its new responsibilities under the Regional Act, and to the Supply System issues by recommitting itself to the preservation of its fiscal integrity. We have made the protection of the Agency's fiscal strength one of our principal objectives and have initiated actions to achieve this goal.

First, our program managers are identifying all opportunities to reduce expenditures and increase revenue to improve our fiscal position. To assure fiscal integrity we are evaluating our fiscal requirements against the test of prudent utility practice, while maintaining our priority commitment to acquire cost-effective conservation and renewable resources. In our initial survey we have identified meaningful potential savings for FY 1982. These savings include program reductions, mostly by deferrals; cash flow reductions; and new revenue sources. We will continue to seek all opportunities for realistic, practical savings that we can implement to achieve program economies.

Second, we have initiated some significant organizational changes which will improve our internal financial controls and help us react to the rapidly changing fiscal situation we are experiencing. We have refocused our attention on fiscal responsibility throughout BPA by strengthening the scope and authority of BPA's Financial Manager. This new Financial Manager is now beginning to address critical financial management issues.

Another key element of BPA's fiscal integrity, after reducing costs wherever possible, is the responsible development of rates that will generate revenues that are adequate to cover its costs. I have personally directed our rates staff to insure that BPA's proposed rates cover these costs. We have recently advised our customers that they can expect increases of up to 80 percent in the rate increase to take effect October 1 of this year. This follows rate increases of approximately 60 percent last year.

Finally, central to any financially sound organization, will be a sound planning process. The top management of BPA has just completed a long-range planning exercise in which we clearly established direction for the Agency's activities. This process has already resulted in management leadership in strategic planning and program formulation, and will be followed by a commitment to evaluate program execution and budget administration decisions in accord with our policy and strategies for fiscal integrity.

## SUMMARY: FY 1983 PROPOSED BUDGET PROGRAM

BPA's proposed budget for FY 1983 is summarized below and compared with FY 1982. Both years reflect the revised budget program structure presented to the Committee at the FY 1982 budget hearings last year.

| Programs | FY 1982 | FY 1983 |
|---|---|---|
| | (in thousands of dollars) | |
| System Operation and Maintenance | 83,300 | 84,600 |
| Power Management | 14,800 | 14,300 |
| Energy Conservation/Resource Acquisition | 190,300 | 444,100 |
| Fish and Wildlife | 4,200 | 5,200 |
| Regional Planning Council | 6,250 | 5,350 |
| Transmission System Construction | 190,000 | 202,000 |
| Purchase Power, Wheeling, and Exchange | 1,093,150 | 1,627,050 |
| Interest Expense from Borrowings | 91,700 | 145,900 |
| Associated Project Costs | 82,900 | 85,100 |
| Total | 1,756,600 | 2,613,600 |

Total budget obligations for BPA's FY 1983 program are estimated at $2,613.6 million, requiring total budget outlays of $2,600.6 million. Assuming average streamflows, revenues from Federal Columbia River Power System (FCRPS) operations and other BPA receipts are estimated at $2,396.1 million. For FY 1983, BPA's estimated net outlays are $265 million.

BPA's net outlay figure is an estimate of the interaction of costs and revenues forecast on the basis of knowledge and assumptions during budget formulation. As either cost factors change--due most often to changes in plans or inflationary pressures--or as revenues change--due mostly to economic activity, weather and streamflows--our net outlay results will vary from forecasted results, as they have in past years. Such changes are anticipated and reflected in Bonneville's current rate revision proposal now under discussion in the region.

## BUDGET PROGRAM HIGHLIGHTS

Program highlights of our FY 1983 budget program are described below.

System Operation and Maintenance. A total of $84.6 million in BPA's proposed FY 1983 budget obligations is for system operation and maintenance. At the end of FY 1981, the transmission system included 13,291 circuit-miles of transmission lines and 357 substations. The system will grow to 13,400 circuit-miles of transmission and 368 substations by the end of FY 1982. By the end of FY 1983, the system will comprise 13,744 circuit-miles of line and 377 substations.

Power Management. Funding of $14.3 million is provided in FY 1983 for the power management program which comprises BPA's traditional responsibilities of rates and revenues, billing, contract negotiation and management, load forecasting, and customer service programing, etc. In response to the mandates of the Regional Act, these activities are expanding significantly.

Energy Conservation/Resource Acquisition. BPA's combined energy conservation/resource acquisition program for FY 1983 totals $444.1 million, which includes funding of $285 million for conservation and $159.1 million for resource acquisition. BPA has planned a $372.7 million program in energy conservation for FY 1983, which is expected to provide approximately 250 average megawatts of electric energy to meet regional loads. Funding from Treasury borrowings is budgeted at $285 million, leaving a requirement for $77.7 million in non-BPA financial participation in these programs and a $10 million undistributed reduction to reflect unknown but anticipated delays in program efforts.

Our program strategy for FY 1983 is centered upon an offering of several energy conservation programs under umbrella conservation contracts drawn up with each participating utility. Ninety-three of our 116 publicly owned utility customers have signed such contracts, and will be able to participate in the following array of programs in FY 1983. Similar contracts will be offered to the eight investor-owned utilities who become BPA's firm power customers.

-- Home energy efficiency improvements, consisting of several services. Residential weatherization provides for retrofitting of electrically heated homes with insulation, dehumidifiers, if required, and clock thermostats. House-tightening measures, including storm windows, storm doors, and weatherstripping are included where no possibility of indoor air quality problems is evident or where mitigating measures are feasible. New methods of providing financial incentives to low-income electricity consumers for weatherizing homes will be available. Water heater wraps and water flow control services continue to be available. And a solar and heat pump water heater program will provide financial incentives in the form of buy-backs or loans to consumers, based on the value to BPA of electricity saved by installation of these devices.

A total expenditure of $214.6 million is planned for home energy efficiency programs. The increase of more than $103 million over FY 1982 reflects the growing momentum of these efforts. Most of this growth is in the area of home weatherization, which offers utilities the option of making direct payments or deferred repayment, no-interest loans to consumers. Estimated energy savings are expected to be 137 average megawatts.

-- New home construction improvement, offering financial incentives to encourage use of conservation or solar design techniques in new home construction. The FY 1983 budget contains $12.3 million for this effort. Implementation of this program has been delayed pending resolution of concerns of the natural gas utility industry in the region and other interests. Estimated savings would be 3 average megawatts.

-- Solar home builders incentives, providing technical and financial assistance for 65 home builder and designer teams chosen competitively to produce homes in seven Northwest cities. The new budget contains $720,000 for this demonstration effort.

-- Commercial energy efficiency improvement, with subprograms for lighting and water heating, lighting conversion, and energy audits. This program will be advanced significantly with an increased commitment of approximately $6.7 million in FY 1983, bringing the total budgeted amount to approximately $15.9 million. Estimated savings are 56 average megawatts.

-- Institutional buildings incentives, providing funding for energy audits, technical analysis, and retrofit conservation projects in nonprofit institutional buildings. This is a new program in the commercial sector, providing financial assistance totaling approximately $8.3 million, with associated energy savings of 19 average megawatts.

-- Financial incentives for the commercial sector, stimulating conservation through programs designed to meet specific needs not addressed in other programs. This program will provide flexibility to governments and utilities in working up their own offerings of conservation acquisitions for BPA. This is a new program, with funding projected at $19.7 million in the first full year and estimated energy savings of 27 megawatts.

-- Street and area lighting incentives, providing for the replacement of inefficient street lamps on city streets. This already established program is slated to receive $18.3 million. Estimated savings are 10 average megawatts.

-- Industrial technology transfer, bringing about exchange of scientific experiences with conservation in production activities by means of seminars. Initial efforts in this area have shown significant interest and $410,000 is budgeted for FY 1983. Industry efforts as a result of these exchanges are expected to show a savings of about 2 average megawatts.

-- Customer system efficiency, bringing BPA's extensive expertise in design of electrical power systems to bear on customers' hardware, reducing losses by replacing transmission equipment and increasing voltage levels. A total of approximately $16.4 million is budgeted for this utility sector program. Estimated savings are 3 average megawatts for the first year of this new program.

-- Conservation and direct-application renewable resource acquisitions, focusing on resources identified in BPA's recent request for resources and on unsolicited proposals. New solicitations in FY 1983 will be targeted in areas found to be promising in an earlier request for information and in studies conducted for BPA. The amount budgeted for these activities is $57.3 million, with estimated energy savings of 6 average megawatts.

-- Technical assistance, providing funds to local governments under contracts with state energy offices for design of building codes. promotion of energy management systems, and assistance with small-scale resource development. A total of approximately $2.4 million is to be made available for these activities.

-- Pilot programs, technical studies, and conservation and renewables research and development are budgeted at $1.3 million, $1.2 million, and $3.8 million, respectively. Each of these programs is experiencing some phasing down due to completion of some specific projects undertaken to provide support for programs now being implemented or about to be implemented. Solar hot water heating pilot programs, tests of residential photovoltaic systems, and heat pump engineering studies continue to receive funding.

The regional energy plan ultimately devised by the Pacific Northwest Electric Power and Conservation Planning Council (Regional Planning Council) will become BPA's guide for conservation and resource acquisition in the future. Decisions about how much money must be invested in conservation and what the energy savings will be beyond 1985 will be reflected in future budgets. Nevertheless, we continue to plot future progress, and our projections reflect BPA's firm commitment to conservation as a mainstay energy resource. We anticipate our conservation programs by FY 1987 could bring conservation savings of more than 1,100 average megawatts, more energy than can be produced by a large nuclear plant. We are also aggressively pursuing complementary financing from sources other than BPA (alternative financing). Bonneville's success in its conservation commitment will be measured not by the speed with which we introduce programs, but instead by their enduring quality and value to the ratepayers of the region.

This budget category also includes estimated obligations of $159 million to cover the costs of resource planning, acquisition, and oversight. At present we are completing the evaluation of 68 proposals we received from prospective sponsors who are asking BPA to acquire the output or capability of generating resources in excess of 500 average kW, which they would be willing to develop. These proposals are being carefully scrutinized to be sure they meet the required statutory tests of cost-effectiveness, environmental quality, compatibility with the system, and technical feasibility. Included in the budget total of $159 million for this activity is $54 million for immediate resource acquisitions.

To help ensure equitable treatment among all the ratepayers of the region, BPA has established eligibility standards for the conservation programs. These require that a utility must execute a new firm power sales contract with BPA in order for ratepayer funds to be invested in that utility's service area for Bonneville's conservation programs. This eligibility requirement supports and implements the cooordinated regional power planning system intended by Congress in the Regional Act. It ensures that the benefits of our regional conservation funding flow only to those consumers whose utilities have joined the coordinated system and have accepted the provisions of the power sales contract related to system planning and operation. Bonneville believes this eligibility requirement is necessary and equitable because, under the Regional Act, we must serve our customers' net firm load growth, whereas our obligation to serve rural and residential loads of IOU consumers is contingent upon the IOU providing, on an exchange basis, the necessary power to Bonneville to serve the load.

Fish and Wildlife. Another major effort under the Regional Act is the protection, mitigation, and enhancement of fish and wildlife on the Columbia River system. BPA has dedicated $5.2 million to fisheries efforts in FY 1983.

In the past year, BPA provided funding for research undertaken in support of the Regional Council's fishery planning to State and Federal fisheries agencies and Indian tribes. The Regional Act directs BPA to fund programs that complement efforts under existing agreements or laws. BPA's fish and wildlife efforts are, therefore, being coordinated with those of the Corps of Engineers and others to avoid duplication.

Regional Planning Council. BPA and the Council have executed an agreement on the method of payment for the Council's expenses which, pursuant to the Regional Act, are to be paid by BPA. BPA is required to pay necessary or appropriate Council expenses up to .02 mill per kWh of BPA forecasted firm power sales annually. The Act provides further that BPA may raise that ceiling and pay Council expenses in an amount not to exceed .10 mill per kWh upon a showing by the Council that the lower ceiling is inadequate for the Council to perform its functions and responsibilities.

Initial funding for the Council, which was shown in BPA's FY 1981 Budget Revision, was held to the lower .02 mill per kWh ceiling. Subsequently, the Council formally adopted a proposed budget for FY 1982 and FY 1983 which together with supporting documentation was transmitted to BPA. That budget proposed FY 1982 Council funding of $6.25 million, equivalent to .071 mill per per kWh, and FY 1983 funding of $5.35 million, which translates into .056 mill per kWh. BPA has reviewed the Council's proposed budgets for FY 1982 and FY 1983 and believes they have met the tests of the Regional Act and are not unreasonable. The Council's budget has also been reviewed by the Department of Energy and the Office of Management and Budget. The Senate Appropriations Subcommittee has also reviewed the Council's budget and has interposed no objection. Funding for the Council is higher in FY 1982 than in FY 1983 because of the larger workload in FY 1982 to complete the Council's fish and wildlife program and to adopt a regional electric power and conservation plan in accord with the timetables formulated in the Regional Act.

The Council has hired a staff; established a headquarters in Portland, Oregon, and one State office in each of the four State capitals; and has contracted with a consulting firm to assist in developing a detailed work plan. The Council has also selected contractors to help produce load forecasts, resource and conservation assessments, reserve and reliability studies, rate design analyses, and other technical efforts necessary in the development of its regional power plan. The Act requires the Council to adopt the plan within 2 years of its establishment, that is, by April 28, 1983.

Transmission System Construction. BPA estimates that its proposed transmission system construction program for FY 1983 will require total budget obligations of $238.9 million. After applying an undistributed reduction of $36.9 million to reflect unidentified delays expected in program obligations, funded obligations of $202 million are proposed. This latter amount compares to FY 1982's funded obligation program of $190 million. About $126.3 million of the total program, or 67 percent, is for continued construction of facilities previously programed and underway (carryover) and about $79.7 million, or 33 percent, is for initiation of construction of proposed system additions, acquisition of capital tools and equipment, and reimbursable work done for others.

There are two major transmission system additions proposed in FY 1983 which require specific approval of Congress in accord with provisions of the Federal Columbia River Transmission System Act. They are (1) Budget Item 127, Grand Coulee-Bell and Creston Integration, and (2) Budget Item 130, Boundary Integration and Colville Valley Support. The first provides for long-range needs to reinforce the Spokane area, substantially reduce transmission system losses, and provides the means to integrate a new source of non-Federal, coal-fired generation into BPA's regional transmission grid. The second integrates additional hydroelectric generation from a non-Federal, hydroelectric resource and reinforces the Colville Valley transmission system. The Big Eddy-Celilo Support project (Budget Item 125) will provide a second 500/230-kV transformer at Big Eddy substation. This project is being proposed to allow the full use of the additional capacity of 400 MW being developed with the D.C. Intertie Uprating project (Budget Item 100).

Purchase Power, Wheeling, and Exchange. The energy exchange requirements of the Regional Act, approximately $630 million, are included in BPA's purchase power, wheeling, and exchange program which totals approximately $1.6 billion in FY 1983. Approximately $600 million is for BPA's costs of acquiring generating capability from three Washington Public Power Supply System (Supply System) thermal projects.

Interest Expense from Borrowings. Interest expense from borrowings require $145.9 million in FY 1983. This program provides for funding of interest associated with construction borrowing under the Federal Columbia River Transmission System Act (FCRTSA) and borrowing to fund new programs authorized by the Regional Act. Funding for this program increased from $91.7 million in FY 1982 to $145.9 million in FY 1983, reflecting increased borrowing for transmission construction and energy conservation and resource acquisition.

Associated Project Costs. The associated project costs program requires $85.1 million in FY 1983 and includes BPA payments covering the costs of operation, maintenance, interest, and amortization of Bureau of Reclamation hydroelectric projects of the FCRPS, and operation and maintenance costs of Corps of Engineers FCRPS projects. BPA pays interest and amortization on these Corps projects not under the program, but by transfer of funds as a capital transfer from the BPA Fund to the Treasury. Associated project costs also cover amounts determined by the Federal Energy Regulatory Commission to be due the Federal Government for downstream benefits realized at non-Federal hydroelectric projects as a result of storage releases from upstream Federal reservoirs. These amounts are collected through BPA revenues and are transferred through this program to the Treasury for benefit of the Corps and Bureau accounts. In FY 1983 BPA will pay $85.1 million in associated project costs to cover the above mentioned Corps and Bureau costs and will also make capital transfers of $115.9 million for the Corps' interest expense and amortization. Since start of FCRPS operation through FY 1981, BPA has paid to the Treasury $1.9 billion in interest on Corps, Bureau, and BPA investments, and has also paid $662.9 million for cash amortization of FCRPS facilities.

## ADP MANAGEMENT

Soon after assuming my responsibilities as BPA Administrator, I was advised of this Committee's interest in BPA's ADP management. I was also informed that the General Accounting Office (GAO) had a strong interest in this area and had made a number of recommendations on how BPA could improve its ADP operations. I have met with the DOE-BPA study team on our ADP operations and am pleased to report today that I believe BPA has responded to these concerns and that we are well on our way to achieving greatly improved management of our ADP resources. I have personally involved myself in this.

This past year we have taken positive steps to carry out the recommendations for improved ADP management made by the GAO and the DOE-BPA study team. Furthermore, we have solicited guidance while endeavoring to keep both parties apprised of our program by written report and oral briefing, and will continue to do so. I have delegated authority for ADP management to the Assistant Administrator for Management Services, thereby consolidating accountability for this function. This was a specific recommendation of the GAO and the DOE-BPA study team. I look to this clear delegation to eliminate old organizational barriers. We also have embarked upon a comprehensive program for improving ADP management and utilization. It includes the introduction of a formal project control system to guide the execution of ADP systems development projects, and the establishment of a formal cycle methodology to improve the quality of definition, design, implementation, and maintenance of computer applications. All these actions reflect new strategies in improved planning, budget and cost control, and systems design and use. Our revised equipment acquisitions plan now envisions fewer minicomputers, but emphasizes the importance of replacing our obsolete, 13-year-old, general purpose computer as quickly as possible.

The improvements in ADP management are closely related to our commitment to fiscal integrity and effective, efficient management of our program and operations.

## BORROWING AUTHORITY

Bonneville is requesting that the Congress provide the entire $1.25 billion in new borrowing authority provided by the Regional Act in appropriations legislation for FY 1983. The full amount of this authority has been included in the budget before the Committee and was an integral part of the BPA program funding included in the President's budget for FY 1983. Although we plan to borrow only $276 million against this authority in FY 1983, Bonneville is requesting the entire $1.25 billion in FY 1983 for two principal reasons.

First, access to the full amount of the new borrowing authority provided by the Regional Act must be made available in FY 1983 to provide Bonneville, the Regional Planning Council, and other participants in the region's power planning process the assurance (needed for planning) that sufficient borrowing resources will be available when required to finance the multi-year conservation and renewable resource programs that will come out of the long-range planning process. Similar planning assurance has been provided BPA's ratepayer-financed transmission construction program since 1974, when the Congress made the full amount of the FCRTSA borrowing authority available to BPA.

Second, we must be able to continue to finance our electric transmission construction program in an orderly manner. While the Regional Act authorizes use of this existing $1.25 billion of borrowing authority provided by the FCRTSA to finance the conservation and renewable resource efforts required by the Regional Act, this existing authority, provided in 1974, was originally intended to be used only to finance transmission line construction for about 10 years. If used only for transmission construction, the existing FCRTSA borrowing authority would not be fully utilized until FY 1984. With the new demands placed on the existing authority by the Regional Act, however, the existing FCRTSA borrowing authority will be fully utilized in mid-FY 1983. The entire $1.25 billion of new borrowing authority authorized to carry out the purposes of the Regional Act should be provided in FY 1983 so that Bonneville may continue to finance transmission construction on an orderly basis.

The ability to plan with financial assurance is central to BPA's implementation of regional energy conservation and resource acquisition programs and meeting electric loads. BPA's FY 1983 borrowing is estimated to be $455 million, consisting of $276 million under the Regional Act and $179 million under the FCRTSA.

## ALTERNATIVE FINANCING

It was not intended, as a result of the Regional Act, that BPA's borrowing authority be the only means used to acquire the region's full energy conservation and renewable resource potential. Therefore, discussions are underway within the region among BPA, utilities, and entities in the financial community, to develop alternative financing mechanisms for these new programs and to achieve BPA's alternative financing goals. Studies of possible alternative funding mechanisms include capital funding by banks, bond brokers, etc., with BPA paying annual debt service requirements. This would reduce BPA's capital requirements and diversify investment participation in the region. Although arrangements are incomplete now, for the purpose of this budget presentation, we have assumed that $21.7 million of the conservation program funding requirements would be financed using alternative methods in FY 1982, increasing to $77.7 million in FY 1983.

## CONCLUSION

Upon enactment of the Pacific Northwest Electric Power Planning and Conservation Act in December 1980, Bonneville embarked upon a changed role in the region's electric power supply system. This role has mandated new and expanded responsibilities and new institutional involvements--with the new Regional Planning Council, utilities, direct-service industrial customers, governmental bodies, and the public. The new Regional Act has also mandated that BPA and other entities with responsibility for the region's electric power supply move positively and expediently to address crucial regionwide electric energy issues and problems. This statement has presented an overview of these issues and problems, the regional response to them in the crucial first-year under the Regional Act, and BPA's proposals in the FY 1983 budget program to advance our electric energy responsibilities to the Pacific Northwest and meet the mandates of the Congress.

Thank you for this opportunity to present BPA's budget program and to discuss our new program responsibilities and activities to date under the Regional Power Act. I and my staff appreciate your interest in our program and welcome your questions.

## BIOGRAPHICAL SKETCH

Peter T. Johnson was born in Boise, Idaho, in 1932. He received a bachelor's degree from Dartmouth College in 1954. The following year he was awarded a master's degree in business administration from the Amos Tuck School of Business in Dartmouth. He completed his military service as a contracting officer in the U.S. Air Force and served in the Idaho Air National Guard.

From 1957 to 1968, Mr. Johnson worked for the MacGregor Triangle Co. of Boise, a firm specializing in heavy highway and utility construction. He was elected a director and executive vice president of the company in 1964.

In 1968, he joined Trus-Joist Corp., an international firm manufacturing roof and floor structural systems. He rose to president of the firm in 1971 and chief executive officer in 1975, overseeing the operations of the company during a period of dynamic growth.

Mr. Johnson became a private business consultant in 1979. He co-chaired a governor's management task force in Idaho during 1980, seeking ways to improve the efficiency and productivity of State government. He also was a member of President Reagan's transition team in 1980–81.

In May 1981, Mr. Johnson was appointed Bonneville Power Administrator by the Secretary of Energy. Bonneville Power Administration is an arm of the U.S. Department of Energy.

As Administrator, Mr. Johnson is responsible for overseeing all activities of the Federal power marketing agency, including operation of one of the world's largest high-voltage transmission systems. He directs the making of policy for BPA and guides Bonneville's effort to implement the Pacific Northwest Electric Power Planning and Conservation Act.

The Administrator is ultimately responsible for decisions on the acquisition of cost-effective power resources by BPA to serve the needs of the region. The act gave BPA the mandate to acquire electric resources, giving conservation and renewable resources priority over conventional generating resources.

He serves on the U.S. Committee of the World Energy Conference, the board of directors of the Electric Power Research Institute, the program committee of the Pacific Northwest River Basins Commission, and is chairman of the U.S. entity under the Columbia River Treaty with Canada.

## FISCAL YEAR 1983 BUDGET

Mr. JOHNSON. Bonneville Power Administration's proposed budget obligations for fiscal 1983 are estimated to be $2.6 billion. This represents an increase of $857 million over fiscal 1982's budget of $1.7 billion. The increase is largely due to Bonneville's new responsibilities for the exchange of power under the Regional Power Act, for acquiring conservation and renewable resources, as well as for the additional debt service obligations on the net billed supply system projects from which BPA is acquiring future output.

This budget will enable Bonneville to continue extending, improving, and maintaining the regional power grid. It also contains sufficient funds for the support of new cost-effective BPA conservation programs mandated by the Pacific Northwest Electric Power Planning and Conservation Act.

You will find in my written statement a more detailed description of the factors affecting our programs and a breakdown of expenditures planned for Bonneville's activities during the fiscal year. I would like to call your attention to the following areas.

### CONSERVATION PROGRAMS

The Regional Act directs that Bonneville acquire sufficient electric resources to meet the region's needs, giving top priority to cost-effective conservation. Of the region's 116 publicly owned utilities, 93 have signed umbrella conservation contracts, making them eligible for BPA programs. We have budgeted $373 million for conservation programs in fiscal year 1983. These expenditures will enable the region to have about 268 average megawatts over time.

Among the conservation programs available in fiscal 1983 are home energy efficiency services, commercial energy efficiency improvements, institutional building incentives, and street and area lighting measures. We also are evaluating proposals from prospective sponsors of generating resources larger than 500 average kilowatts. We have included funds for possible acquisition of cost-effective renewable resource and cogeneration projects in this category.

### BILLING CREDITS

You will notice that no funds are specifically identified in the 1983 budget for billing credits. However, it is contemplated that billing credits may be granted. We are very close to development of a methodology to carry out this very complex requirement of the act. However, there was no reasonable way to estimate actual billing credit costs in the absence of the methodology. Billing credits which are approved during the year will offset resource acquisitions or short-term power purchases covered in the budget. We expect to implement billing credits by the summer of 1982.

### NEW BORROWING AUTHORITY

Bonneville is asking that Congress, in appropriations legislation for fiscal 1983, provide the entire $1.25 billion in new borrowing authority authorized by the Regional Act. Although we plan to borrow only $276 million against this authority in the next fiscal year, we must know that the borrowing capacity is available to make commitments and finance the conservation and renewable resource programs emanating from the regional planning process.

We must also preserve the existing borrowing capacity for transmission improvements, rather than expend it to carry out the purposes of the Regional Act.

### FISH AND WILDLIFE PROGRAMS

We have also included funds for fish and wildlife efforts mandated by the Regional Power Act. The act directs BPA to fund programs that complement activities under other agreements or laws. Therefore, we are coordinating our funding with efforts of the Corps of Engineers, the Bureau of Reclamation, and others who are involved in this area.

### REGIONAL PLANNING COUNCIL

The Regional Planning Council has begun its forecasting and planning efforts and Bonneville's budget shows funds for support of this entity. We have reviewed the Council's proposed budgets for fiscal years

1982 and 1983 and we believe these budgets meet the tests of the Regional Act and are not unreasonable.

### PURCHASE POWER AND WHEELING

Under purchase power and wheeling, we have included funds for acquiring the generating capability of the three Washington public power supply system thermal plants. Funds to carry out the power exchanges with investor-owned utilities required by the act are also provided here.

### CONSTRUCTION PROGRAM

In the area of transmission construction, BPA plans two major system additions in fiscal 1983 which require specific approval of Congress under the Federal Columbia River Transmission System Act of 1974. They are the Grand Coulee-Bell and Creston integration and the boundary integration and Colville Valley support. The first provides for long-range needs to reinforce the Spokane area. The second integrates additional hydroelectric generation from a non-Federal resource and reinforces the Colville Valley system.

### REGIONAL ECONOMIC CONDITIONS

Before I conclude, however, I will mention something that I feel is very important about this budget and future budgets we will bring before you. The national economic recession has had an impact on the Pacific Northwest and Bonneville in the form of lower than projected power sales and revenue. Residential and industrial electrical use is down. Reduced cash flow is affecting many activities of the agency and we are making difficult decisions in developing our current rate case. These economic conditions and the costs of the supply system projects have prompted Bonneville to move aggressively to preserve its fiscal integrity.

Our program managers have identified opportunities to reduce expenditures and increase revenue to improve our fiscal position. We have initiated significant organizational changes which will improve internal financial controls. We have engaged in a sophisticated, long-range planning exercise to establish direction for the agency's activities, and we have proposed rates sufficient to cover the obligations of the agency.

This budget gives Bonneville the ability to move ahead with those programs mandated by the Regional Act and designed for the benefit of the Pacific Northwest. I would also mention that at the time my prepared statement was submitted, I had been informed that the owners of WPPS plants No. 4 and No. 5 had completed agreements to fund the orderly termination of those plants. I must correct my statement, because I have been informed that that is not yet the case.

I want the record to be correct in that regard.

Mr. Chairman, I will be happy and pleased to answer questions that you have.

### REGIONAL ENERGY DEFICIT AND LOAD FORECAST

Chairman HATFIELD. Thank you very much, Mr. Johnson. Let me pick up on your last point about these reductions because of the economic circumstances. Last year Bonneville Power Administration testified before this committee that they were projecting very serious energy deficits. I believe they used the figure in last year's testimony about an average of 1,500 megawatts in 1982 and maybe as much as 4,000 by the end of the decade.

You have focused now upon the rather significant reductions in demand from all customer groups throughout this past year. My question is, What is your estimate now for next year as to the current power supply picture and the water outlook, not only for the next year but also, I understand, you have some preliminary findings on a long-term projection over and above the Northwest Council projection. When can we expect the forecast of the so-called preliminary work on that inhouse projection in the long term, perhaps as far as the end of the decade.

Mr. JOHNSON. Mr. Chairman, at the present time we are engaged in the development of a load forecast. We are in the late stages of that effort and the indications are that the proposed load forecast will be lower than earlier forecasts although the technical staff are not yet prepared to say exactly what the proposed load forecast's rate of growth in the demand for electric energy will be. I can say this, based on preliminary data which has been produced, the proposed load forecast will likely include a range of growth in the demand for electric energy, and we think that the region's load will fall within that range.

Chairman HATFIELD. That is the long term?

Mr. JOHNSON. Long term.

Chairman HATFIELD. What about the short term, say, as far as the end of the year?

Mr. JOHNSON. Loads have fallen significantly. They are significantly below what we previously forecast.

Chairman HATFIELD. Can you give us a numerical estimate on those reductions?

Mr. JOHNSON. I am told in the case of our public customers, that their loads have been close to 10 percent less than they forecasted.

Chairman HATFIELD. In your long-term forecasting, are you including WPPS 1, 2, and 3 in your forecasting of resources or the impact of conservation on those loads?

Mr. JOHNSON. Yes, Mr. Chairman. After we made our forecast, which is our sales projection, in a sense, supply system plants 1, 2, and 3 will be in the resource base to serve that load. In addition to these plants, we will also have the cost-effective conservation that we have assessed which will be available to the Administrator for his customers to acquire.

Chairman HATFIELD. Do you consider it a little early to make an estimate or judgment on WPPS 1, 2, and 3—that power produced by those plants might be surplus by the end of the decade as some have indicated?

Mr. JOHNSON. Our forecasts are not complete, so we are not prepared to answer that specifically. I believe some forecasters have suggested that WPPS No. 3 might not be needed on the schedule on which it is presently being constructed.

## CONSERVATION ACTIVITIES

Chairman HATFIELD. Let's turn to the conservation aspect of the BPA program. Can you give us any kind of general ballpark figure as to the amount of the future load that can be carried by a comprehensive conservation program or what you would like to set as a goal, some way to identify the role conservation will play as equivalent to new source of energy, which is the essence of the mandate and direction in the Northwest Energy Act?

Mr. JOHNSON. As we acquire resources, we are going to follow the priorities under the act. The first priority is cost-effective conservation. There are absolutely no qualifications or limits placed upon it. For fiscal year 1983, we plan to spend $373 million, as I indicated, for 268 average megawatts of energy. We believe that we will be well over 500 megawatts by the year 1985 and perhaps as high as 1,100 megawatts by 1987 that will be acquired through these programs.

Chairman HATFIELD. Do you think that is an achievable goal?

Mr. JOHNSON. We believe so; yes.

Chairman HATFIELD. Do you have the program implemented and are personnel and resources in place to move ahead with the conservation program?

Mr. JOHNSON. Yes; we have. The position of Assistant Administrator of Conservation and Direct Application Renewables is presently headed up by a gentleman who has a familiarity with the act. He inherits an organization that has already been created. It has been moved out from power management and is concentrated under his leadership. There are roughly 60 people in that particular office at this time and it is projected to expand beyond that in the months ahead.

Chairman HATFIELD. Is there line authority for that role or is this purely a staff advisory role?

Mr. JOHNSON. Mr. Chairman, as it was created under the act, it was a judgment call of the Administrator. Initially, it was launched as a staff function reporting to the Administrator, nevertheless, influencing policy through our policy committee, but not accountable as a line authority for results. That has been changed, effective before the end of last year. At this time, it has line authority as well as accountability.

## UTILITY SUPPORT OF CONSERVATION PROGRAM

Chairman HATFIELD. Are you having problems with the investor-owned utilities cooperating or participating in the conservation program?

Mr. JOHNSON. I could not answer that yes or no. I would say that they are in the process of evaluating a complex situation as a process of implementing the act. None of the utilities at this time have seen their way clear to sign the contracts for the conservation programs. They have elected not to because we have made it a condition of the requirements contract that they must place a load upon the Administrator.

Chairman HATFIELD. I am puzzled as to what would be the reluctance or reticence—have you had similar problems with the co-ops, PUD's, municipalities, or other entities that are distributing and generating power?

Mr. JOHNSON. Mr. Chairman, as I look at it, in the wisdom of Congress there was 1 year allowed for the prospective customers of the agency to evaluate offers that are being made, I would say private as well as public utilities are in the process of evaluating that at this time. The exchange did go forward and private utilities did sign the exchange contracts as well as the direct service inustries. It provides lower rates to the residential and small farm customers of the investor-owned utilities.

Only a few public utilities have signed the new requirements contract. They still have outstanding contracts. We are continuing to serve them.

A number of the public utilities, 93 out of 116, have signed the umbrella conservation agreement under which they have been able to avail themselves of the programs.

Chairman HATFIELD. I can't understand—the reticence on the part of IOU's whereas the public utilities people have moved ahead——

Mr. JOHNSON. The investor-owned utilities could sign these conservation contracts, if they elected to. If they elect later not to sign the requirements contracts, they either would have to return dollars or equivalent energy to the Administrator. They have not elected to do that, yet.

Chairman HATFIELD. Does that indicate they are less interested in conservation than the public utilities?

Mr. JOHNSON. I don't think so. I think that the IOU's have a good track record on conservation and they have done quite an outstanding job. I think the issue they face is evaluation of the power sales contracts offered by BPA. We may have to wait until the date for them to complete that evaluation, which is August 28, 1982, before we know their decisions.

Chairman HATFIELD. Tell them it makes me very nervous, not that that is going to make any great difference in the time span. I do think public perception at this point cannot help but to say, "Why aren't the private utilities and the IOU's moving in the same direction regardless of their past track record? Why are they holding back? Public utilities are not. Public utilities and various other non-investor-owned utility groups are joining in." It is bad PR, if nothing else.

Besides, it is good economics, wise policy. I know two leaders out there, Bob Short and Don Frisbie, at least two in Oregon, have always been considered to be very progressive oriented people, very much involved in innovative and creative work. They do have a good track record. I can't understand the reluctance. Maybe I should ask that question of them. Would that be helpful?

Mr. JOHNSON. I think that would be appropriate if you want to get their side of the issues. The issues in these contracts are very complex, Mr. Chairman. These new requirements contracts tie parties in for the next 20 years to the entire fabric, if you will, of the Regional Act. We have the regional council. We have duties as well as the benefits that flow from that Council and these people are assessing that very carefully. Certainly we stand ready to serve them if they want to avail themselves of this conservation contract.

Chairman HATFIELD. Are you saying there are other reasons, other than conservation, that may be tied into the economics?

Mr. JOHNSON. In all candor, there is an argument over the fact that we have made a requirement that they place a load upon the Administrator before we can extend to them the benefits, the incentives to acquire conservation.

## WPPS PLANTS 4 AND 5

Chairman HATFIELD. Regarding WPPS units 4 and 5—I know the Bonneville Power Administration has not been involved directly and we have discussed this matter frequently. Yet, I know that you have been monitoring this situation closely. Could you give us a brief status report on the anticipated controlled termination of these two, obviously, uneconomical and disastrous plants?

Mr. JOHNSON. The participants have a termination plan which requires roughly $70 million but it is not in place yet. I indicated it was in place and I had to correct that because I have been informed that is not the case.

That is about all I can report on. I am very hopeful the termination plan will move forward smoothly.

Chairman HATFIELD. Thank you very much, Mr. Johnson. I appreciate your testimony very much. We have other questions that we will submit to you for the record because of the fact that we have other agencies to hear from. I would like to invite Senator Mattingly to ask any questions.

## ENERGY SALES

Senator MATTINGLY. I would like to ask you one question. What is the projected sale of kilowatts for fiscal year 1983?

Mr. JOHNSON. I believe 117 billion kilowatts.

Senator MATTINGLY. 117 billion?

Mr. JOHNSON. That is my recollection.

Senator MATTINGLY. Maybe I have got my figures wrong here. I thought that in fiscal year 1981 you sold 127.7 kilowatts, is that right, and then fiscal year 1982 projected 151.1.

Mr. JOHNSON. Is that for all the Power Marketing Administrations?

Senator MATTINGLY. Right. Does anybody have that?

Chairman HATFIELD. You can provide that for the record.

Mr. OGDEN. In 1981 there was a total of 133.3 billion kilowatt-hours sold by all five Power Administrations.

Senator MATTINGLY. I wonder what your projection is for fiscal year 1983?

Mr. OGDEN. We will furnish that for the record.

Senator MATTINGLY. I would like to have that—it says 2.9 in here—just for my own information if you might be able to help. I notice the sales for fiscal year 1982 increased 20 percent and the revenues increased 70 percent. I just wonder what was the great variance? Was it inflation, as everybody says, or was it something else?

[The information follows:]

### POWER MARKETING ADMINISTRATIONS' POWER SALES AND ANTICIPATED REVENUES—FISCAL YEARS 1981–83

Although the total number of kilowatt-hours sold has varied only slightly, revenues have increased significantly, due primarily to rate increases to cover increased costs of operation and maintenance and purchased power, and to insure timely recovery of capital investments with interest.

| | Fiscal year— | | |
|---|---|---|---|
| | 1981 (actual) | 1982 (estimated) | 1983 (estimated) |
| Alaska Power Administration: | | | |
| Kilowatt-hours sold (billions) | 299 | 284 | 303 |
| Gross revenues (millions) | $3.8 | $4.0 | $4.3 |
| Southeastern Power Administration: | | | |
| Kilowatt-hours sold (billions) | 5,729 | 6,450 | 6,680 |
| Gross revenues (millions) | $57.3 | $61.2 | $65.9 |
| Southwestern Power Administration: | | | |
| Kilowatt-hours sold (billions) | 5,131 | 5,357 | 5,357 |
| Gross revenues (millions) | $51.5 | $62.5 | $66.7 |
| Western Area Power Administration: | | | |
| Kilowatt-hours sold (billions) | 37,866 | 37,040 | 37,992 |
| Gross revenues (millions) | $383.8 | $370.3 | $399.7 |
| Bonneville Power Administration: | | | |
| Kilowatt-hours sold (billions) [1] | 84,187 | 85,200 | 85,200 |
| Gross revenues (millions) | $817.0 | $1,805.2 | $2,396.1 |
| Totals: | | | |
| Kilowatt-hours sold (billions) | 133,212 | 134,331 | 135,532 |
| Gross revenues (millions) | $1,313.4 | $2,303.2 | $2,932.7 |

Source: Fiscal year 1983 congressional submission.

[1] For Bonneville Power Administration this represents energy generated by U.S. Corps of Engineers and U.S. Bureau of Reclamation plants in the Federal Columbia River transmission system. The total kilowatt-hours sold, including power wheeled and exchanged is 81,200 in fiscal year 1981 and is estimated to be 101,900 in fiscal year 1982 and 117,100 in fiscal year 1983.

## RATE INCREASES

Mr. JOHNSON. Our rates have gone up, driven by the net billed projects, the capability of three units we are acquiring from the Washington public power supply system. Some $726 million in this next rate case will be used to pay debt service on these three units which are not supplying kilowatt-hours yet. That has been a factor in deriving the budget.

Chairman HATFIELD. Prepayment.

Senator MATTINGLY. Let me ask you another question in followup to the chairman's question earlier.

If the consumption goes down, do you try to raise rates to compensate for that, or where do you go?

Mr. JOHNSON. It is not allowed in our rate proceeding that we allow for contingencies, something I was disappointed to discover. Nevertheless, it is incumbent upon us as a utility to make sound prudent projections based upon what we believe is likely to happen and then, likewise, the concepts required to meet those particular loads.

We do have, on an annual basis, the opportunity to modify rates and, at that time, we would have the opportunity to make adjustments that might be necessary.

Senator MATTINGLY. Meaning, ask for adjustments?

Mr. JOHNSON. A rate increase, if necessary, or a rate decrease, if that might one day come to pass.

Dr. OGDEN. I think we need to offer some explanation for all five.

Senator MATTINGLY. Yes, it would be helpful.

### MARKETING SITUATION

Dr. OGDEN. Mr. Johnson has a unique situation, because he is the sole power supplier for his preference customers in many cases, so if they were to decrease their loads, they would decrease the demand on him.

For the rest of the Power Administrations, they are only partial power suppliers of most of their preference customers. There are a few exceptions for the Western Power Administration. In that case, since our hydropower is the cheapest source of energy available to the customers, it is inconceivable that the customers would not take everything that was available from us and forego other more expensive power.

In short, there is very little chance that the other Administrations could not market all of their power. Alaska has a unique situation in Juneau and Mr. Cross can speak to that.

The others are in a situation where the demand for their power probably exceeds their supply many times. A decline in demand would probably not affect their sales.

Senator MATTINGLY. Thank you.

Chairman HATFIELD. Senator McClure and other members of the committee may also have questions.

We will combine them all and submit them to you, Mr. Johnson.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY CHAIRMAN HATFIELD

### CONSERVATION

Chairman HATFIELD. What has BPA accomplished in conservation program implementation since passage of the Regional Act?

Mr. JOHNSON. In 1981, BPA awarded 18 technical assistance grants to local entities for use in local energy planning projects. The total amount of these grants was approximately $700,000.

Five pilot programs developed previous to the passage of the Regional Act have since been implemented, providing BPA and the region's utilities with valuable experience in managing conservation and direct-application renewable resource programs. These programs include a pilot residential weatherization program, two residential solar water heating pilots, and two small wind pilot programs.

We have offered five regionwide programs to utilities in the Pacific Northwest. As of February 2, 1982, 93 publicly-owned utilities have signed contracts. I would like to insert for the record a table which lists these programs and the number of utilities signed.

[The information follows:]

BPA PROGRAM ACCOMPLISHMENTS TO DATE

| Program | Date offered | Number of utilities |
|---|---|---|
| Shower flow restrictors | 8/14/81 | 80 |
| Water heater wraps | 8/14/81 | 88 |
| Street and area lighting | 9/16/81 | 56 |
| Commercial lighting and water heating | 9/16/81 | 29 |
| Residential weatherizations | 11/14/81 | 14 |

Chairman HATFIELD. What do you anticipate accomplishing in the next 5 years?

Mr. JOHNSON. Between fiscal year 1982 and fiscal year 1987, we expect to implement conservation programs requiring approximately $2.3 billion in BPA expenditures; these will save approximately 1,100 average annual megawatts by fiscal year 1987. Our new programs will target available energy savings in all sectors, including residential, commercial, and industrial, as well as public agencies.

Currently, we are negotiating with States and local entities to implement programs covering institutional buildings, low-income weatherization, and State technical assistance grants. We are also negotiating with utilities to expand our water heating efficiency efforts to include low-flow shower heads and to develop a comprehensive commercial sector audit program.

## CONSERVATION AND BILLING CREDITS

Chairman HATFIELD. Would you explain the eligibility standards for BPA's conservation program and for billing credits?

Mr. JOHNSON. I have established the requirement that a utility must execute a firm power sales contract with Bonneville in order for ratepayer funds to be spent in that utility's service area for BPA conservation programs. A utility cannot establish eligibility for conservation programs merely by signing a residential exchange contract.

This decision has raised substantial controversy. Public comment on this issue has already been accepted in our public review process for the long-term conservation contracts.

I believe that Congress provided the Administrator with the authority to acquire conservation and generating resources so that the Administrator would be able to serve the increasing firm power loads which will be imposed on Bonneville because of the Regional Act. Such loads must be served, except in times of insufficiency, regardless of whether the customers sell any power to BPA. These are actual load obligations. The Administrator's obligation to serve the rural and residential loads of exchange customers is not the same kind of obligation, in that it is not a net additional obligation on the Administrator. The exchange obligation, rather, is contingent upon the customer providing the necessary power to Bonneville to serve the load. I believe the Administrator's obligation to purchase the power offered by exchange customers was envisioned to be a blind obligation in order to allow exchange customers the freedom to develop their own resources and operate their own systems as they saw fit. Except where the average system cost of exchange power approaches the margin—in which case use of the "in lieu" purchase authority would be considered—I do not intend to alter this blind obligation envisioned by Congress.

The eligibility position I have outlined serves to support and implement the coordinated regional power planning system which was intended by Congress in the Regional Act. I believe that the benefits of BPA's regional conservation funding should flow only to those utilities which have opted to join that system by accepting the provisions of the power sales contract related to system planning and operation. There may be economic benefits which would flow to certain utilities by adopting a different position on eligibility, but I do not believe that it would serve to establish the coordinated regional system intended by the Regional Act.

I have also established an eligibility policy for billing credits. This will also be subject to public review and comment. This policy goes further by requiring all utilities to sign new power sales contracts in order to be eligible for billing credits. Existing power sales contracts will not be sufficient because, as a result of the notice of insufficiency which still controls these contracts, they do not require BPA to acquire any more resources to serve them. Since billing credits may be granted only for projects which reduce our obligation to purchase other resources, only new contracts can make a utility eligible for billing credits.

## INDOOR AIR QUALITY

Chairman HATFIELD. As I understand it, BPA has temporarily excluded 60 to 80 percent of all homes from its house-tightening measures due to concerns over indoor air pollution. Please explain the problem.

Mr. JOHNSON. Indoor air quality can be adversely affected by house-tightening measures, which usually are included in weatherization programs. Weatherization measures such as weatherstripping and caulking reduce air infiltration and result in higher concentrations of indoor air pollutants, including radioactive radon, formaldehyde, particulates, and other pollutants. Due to potential health hazards, BPA must exercise caution in implementing house-tightening measures in the regionwide weatherization program.

An environmental assessment of the impacts of the regionwide residential weatherization program completed in April 1981 showed that the cumulative impacts of the program could be significant. Major potential health impacts identified included respiratory irritation and increased risk of lung cancer—the potential of 100 or more cancer fatalities regionwide over the life of the program. According to the regulations of the Council on Environmental Quality, BPA either had to restructure the program to avoid significant impacts or prepare an environmental impact statement before program implementation. The significance of the impacts described and the need to avoid impacts was underscored by comments on the environmental assessment from the Oregon Department of Energy, the U.S. Department of Energy NEPA Affairs Division, the U.S. Department of Health and Human Services, and regional utilities.

It was widely assumed that the EIS done for DOE's Residential Conservation Service program would be adequate documentation for BPA's program. Since this document determined that no significant impact resulted from installation of house-tightening measures, its use would have speeded BPA program implementation. However, the EIS was completed in November 1979, and so preceded new CEQ regulations which applied to BPA's efforts. In addition, the large volumes of research completed since the Residential Conservation Service EIS rendered it out of date for BPA purposes.

BPA is now preparing an EIS for the regionwide weatherization program. In the interim, the program has been modified to allow immediate offering. The availability of house-tightening measures such as caulking, weatherstripping, storm windows and doors, and outlet gaskets is restricted under the program to homes where major sources of pollutants are minimal or absent. These homes constitute about 30 percent of the homes eligible for the weatherization program. To insure that the public is apprised of the potential risks and the methods that can reduce these hazards, utilities will distribute to all participating homeowners a brochure discussing indoor air quality. These modifications allow BPA to implement the program without delay.

To help answer some of the questions surrounding the issue of indoor air quality, BPA is conducting systematic research to assess the sources of pollutants, the impacts of weatherization measures on air infiltration and pollutant concentrations, and the effect of accumulated indoor air pollutants on human health. The results of this research, coupled with environmental documents prepared for the weatherization program, will provide a continually improving basis for assessing indoor air quality impacts. With this information available, it is unlikely that the difficulties we are now encountering with the weatherization program will be repeated. However, we must consider indoor air quality in the design of any future programs which include measures affecting air exchange rates in structures.

BPA's decision concerning the indoor air quality issue has drawn criticism from our utility customers. The utilities feel the restrictions on house-tightening measures create administrative complications and provoke unnecessary homeowner concerns. They also protest the limited availability of measures which are in great demand, such as storm windows and doors for the majority of participating homes. We appreciate these concerns, and we are working through our EIS and our research to make house-tightening measures as widely available as possible. Within legal bounds, we have committed to reimburse utilities retroactively for those BPA restricted measures which are determined to be environmentally acceptable. Upon completion of a final EIS in April 1983, it is possible that the restricted measures would be made available to all participating homes.

Chairman HATFIELD. Have these concerns slowed down implementation of this program, which is similar to ongoing programs of private utilities and TVA?

Mr. JOHNSON. Indoor air quality concerns delayed the start of BPA's weatherization program. They have also limited our ability to offer house-tightening measures under the program.

Initial implementation of the program was delayed during the review of the environmental assessment for the program, when comments received indicated that the program would have to be modified to avoid potential impacts. Delays resulted because program schedules had not anticipated the need for modification.

Availability of house-tightening measures to some homes has been delayed by uncertainties about the potential health risks of indoor air quality problems in tightened homes. These measures were to be offered to all homes under the original program, but will be delayed for homes with certain characteristics until we can be reasonably confident that they will not cause significant adverse impacts on human health. I would like to note, however, that even under the current program restrictions, several utilities which have begun to implement the program have found consumer response to be almost overwhelming.

Similar programs by private utilities and TVA have not been subjected to the same depth of analysis as BPA's program. Private utility programs are not subject to NEPA requirements, so documentation of potential human health impacts has not been necessary. TVA's program was started in 1977, before awareness of potential health impacts had developed. TVA and utility groups, such as the Electric Power Research Institute, are now in the process of analyzing the issue and conducting research to better define the problem and its significance.

## WASHINGTON PUBLIC POWER SUPPLY SYSTEM

Chairman HATFIELD. Last month, after the announcement of termination of WPPSS 4 and 5, the supply system raised $850 million in revenue bonds for WPPSS nuclear plants with strong investor demand—even enthusiasm—for the securities.

In your opinion, what were the reasons for the unexpected investor interest in the bonds and what effect did the WPPSS 4 and 5 announcement have on the investors?

Mr. JOHNSON. The supply system sold $850 million of WNP Nos. 1, 2, and 3 revenue bonds into a municipal bond market which had been gradually improving in response to news of continued recession statistics. The supply system sale had been announced well in advance so that no other large issues of municipal bonds were in the market. These factors, together with the relatively attractive yields which were offered on bonds rated triple A by Standard & Poor's and double A by Moody's, created a demand for substantially more bonds than were offered.

Other factors affecting investor interest were the supply system's report that construction is ahead of schedule on projects 1 and 3, that the three project construction budgets have remained unchanged except for impacts caused by termination of projects 4 and 5, and the announced emphases on fiscal integrity by Bonneville and the supply system, including BPA's recent rate increase proposal.

The announced termination of projects Nos. 4 and 5 and participants efforts to control the termination through loan agreements was not good news to the market but did lend certainty to a previously uncertain regional question. This element of increased certainty assisted in creating a positive atmosphere for the sale.

## WASHINGTON INITIATIVE 394

Chairman HATFIELD. Last year Washington State voters passed initiative 394 requiring prior public approval of any proposed revenue bond issue. This initiative takes effect on July 1, but it is being challenged in court. Please explain BPA's concern over this State initiative.

Mr. JOHNSON. This initiative has prompted the concern of the Department of Justice, the Department of Energy, and BPA, because, according to its terms, less than one-half of the electorate in the State of Washington could defeat a proposed bond issue for continued financing of construction of projects needed to meet the power demand through-out the Pacific Northwest. This would result in bringing construction to a halt. Because the capability of projects 1, 2, and 3 was made a part of the Federal base system by the Pacific Northwest Electric Power Plan-ning and Conservation Act, the unavailability of power from those projects could require BPA, by the end of the decade, to acquire replacement power to meet firm power requirements at an estimated annual cost of $850 million to $1.5 billion more than the operating costs of these projects, and to continue to pay the debt service on the $5.5 billion bonds previously issued.

Additionally, the initiative could be viewed as interfering with the net billing contracts since the initiative may impair the existing contractual obligations between the supply system, BPA, the participants in the projects, and the bondholders to construct the plants, deliver power from the plants, and to retire the bonds from the proceeds of the sale of power.

The initiative may also deny the opportunity of all participants in the projects to vote on financing for those projects. It appears that in the State of Washington alone, 21 participants in WNP-1, 17 in WNP-2, and 21 in WNP-3 who are not members of the supply system would be disenfranchised by the initiative. Thus, a very small electorate of the members of the supply system in the State of Washington would control the affairs of a vastly larger number of participants, not only in the State of Washington, but in the entire Pacific Northwest.

Chairman HATFIELD. Will BPA be involved in the lawsuit challenging this initiative?

Mr. JOHNSON. The issue of intervention on behalf of the United States is being reviewed by the Department of Justice and the Department of Energy. Whether BPA will be involved in the litigation will depend on the outcome of such review.

Chairman HATFIELD. Has the Justice Department decided to get involved in the lawsuit?

Mr. JOHNSON. The issue continues to be under review.

## RATE INCREASES

Chairman HATFIELD. Mr. Johnson, last year in testimony before this subcommittee, BPA discussed the end of an era of bountiful, low-cost hydroelectric energy for the Northwest and a period of rapid, large cost increases. Last year there were wholesale rate increases of about 60 percent and last month you announced priority firm power rate increases of an estimated 80 percent for later this year. Please explain the factors that are responsible for these increases.

Mr. JOHNSON. The priority firm rate increase placed in effect July 1, 1981, reflected increases in several areas of BPA's costs. The largest single factor was increases in the investment costs of the supply system's nuclear projects 1 and 2. The causes underlying these cost increases included increased construction design requirements, delays due to labor difficulties and other factors, and inflation in investment costs. Approximately 30 percent of the required 1981 priority firm increase was due to increased supply system costs.

New additions to the Federal investment, as well as increases in operation and maintenance expenses and increased Federal replacement costs caused by the high rate of general inflation throughout the economy, accounted for an additional 26 percent of the priority firm increase. Approximately 23 percent of the increase was due to the receipt of lower than anticipated revenues under rate schedules which BPA established in 1979 for sale of firm capacity and reserve power, respectively.

About 15 percent of the increase was due to a discrepancy between actual and planned amortization of the Federal investment since the time of the 1979 repayment study. That study was based on revenue received under average water conditions. Since average water conditions did not occur, BPA was unable to reduce its amortization obligation as planned.

The remaining 6 percent of the 1981 priority firm increase was to recover renewable resource and conservation costs, as well as costs associated with program administration, as authorized and required under the Pacific Northwest Electric Power Planning and Conservation Act.

Some of the same factors underlying the 1981 rate increase are also responsible for major portions of the projected October 1, 1982, rate increase. Supply system costs for nuclear projects 1, 2, and 3 account for approximately 75 percent of the increase in the priority firm rate. Higher bond interest rates, additional costs that would have been shared with projects 4 and 5 had they been completed, and the commencement of debt service payments for project 3 were the factors primarily responsible for increases in supply system costs.

The remaining portion of the projected 1982 priority firm increase results from anticipated increases in operation and maintenance expense and increases in investments in conservation.

### DEBT SERVICE PAYMENTS

Chairman HATFIELD. What percent is directly attributable to the payment of debt service on Washington Public Power Supply System's 1, 2, and 3?

Mr. JOHNSON. Approximately 30 percent of the 1981 priority firm rate increase was due to increased Washington Public Power Supply System's costs. Approximately 75 percent of the 1982 priority firm rate increase is due to increased Washington Public Power Supply System's costs.

### RATE INCREASES

Chairman HATFIELD. What is your projection for future rate increases?

Mr. JOHNSON. We currently are anticipating additional rate increases on October 1, 1983, and July 1, 1985. Whereas BPA's priority firm rate is expected to increase to between 18.5 and 20.5 mills per kilowatt-hour on October 1, 1982, the projected rate level commencing October 1, 1983, is presently projected to range between 23 and 25 mills per killowatt-hour. We do not currently have repayment studies upon which to base estimates of the July 1, 1985, rate level.

### COST REDUCTIONS

Chairman HATFIELD. What are you doing to reduce costs, particularly escalating nuclear power costs?

Mr. JOHNSON. We have made the protection of Bonneville's fiscal strength one of our principal objectives and have initiated actions in several areas to reduce costs and strengthen our control over the economic factors affecting our costs and revenues. Our program managers have reexamined their short-range program requirements and identified opportunities to reduce expenditures and increase revenue to improve our fiscal position. We have initiated significant organizational changes which will improve internal financial controls. We have engaged in a sophisticated long-range planning exercise to establish direction for the agency's activities.

In addition to these actions, with specific regards to the escalating nuclear power costs of the Washington Public Power Supply System, the supply system and Bonneville have jointly established a goal to reduce cash flow requirements and the direct construction cost of projects 1, 2, and 3. The analysis of the cost and schedule impact of a 15-percent reduction in the cash flow requirements will be concluded during the supply system's 1983 budget process. However, there is no present intention of Bonneville or the supply system to put into effect the proposed reduction if a schedule delay would result.

BPA's internal auditors have conducted various audits at the supply system. Two which have recently been completed deal with the allocation of costs between the twin unit projects—WNP 1/4 and WNP 3/5—and with the allocation of administrtive and general costs between the projects. These were, obviously, conducted prior to the termination of WNP 4/5.

### WPPSS PLANTS 4 AND 5

Chairman HATFIELD. Now that the mothball proposal has been replaced by the decision to terminate the WPPSS 4 and 5 plants, will you submit a budget amendment to clarify the record on the escrow agreement portion of the budget justification?

Mr. JOHNSON. Since the WNP 4/5 escrow agreement did not affect either net obligations, net outlays, or receipts from borrowing, we do not intend to submit a budget revision to reflect the changed WNP 4/5 circumstances. The reason this does not affect either of those items is that funds were to be received by BPA from the participants in the mothball plan and a like amount, less BPA administrative expenses, disbursed to the supply system.

Chairman HATFIELD. How does this change to termination affect your budget submittal?

Mr. JOHNSON. The change from WNP 4/5 mothball plan to termination really has no effect on our budget since the escrow agreement itself did not affect either net obligations and net outlays or revenues and receipts.

Chairman HATFIELD. The budget states that there will be no cost to BPA as escrow agent, then why is there a need to cite specific amounts in the budget for fiscal year 1982 and fiscal year 1983?

Mr. JOHNSON. We are required to include reimbursable items such as the escrow agreement in our budget documents under the OMB instructions for budget preparation. These instructions require that trust and reimbursable agreement funds be included in budgets for purposes of reconciling OMB budget data and Treasury reports.

Chairman HATFIELD. Please describe in detail each step taken by BPA to present the escrow agreement portion of the budget in a different way in order to clearly show the special nature of this item and the limited involvement of BPA in this item.

Mr. JOHNSON. In late October 1981, BPA notified you, Mr. Chairman, as well as your counterpart in the House, Mr. Bevill, chairman of the Subcommittee on Energy and Water Development; the Office of Management and Budget; and the Department of Energy Assistant Secretary for Conservation and Renewable Energy, of our intent to accept a request to be an escrow agent in the WNP 4/5 mothball plan. We indicated in those notification letters that our entering into the escrow arrangement did not commit BPA to future involvement, acquisition, or implied oversight of WNP 4/5. Our responsibilities were limited basically to the receipt and disbursement of funds with reimbursement for appropriate administrative expenses. We also noted that the escrow agreement would be shown in our fiscal year 1983 budget document which was submitted in January 1982.

Since the escrow agreement is a type of trust, or reimbursable agreement, we are required by OMB instructions, to include it in our budget. The escrow agreement was separately identified and described in the budget document.

## CONSERVATION

Chairman HATFIELD. BPA is in the process of negotiating some new programs for energy conservtion involving State and local governments. Please indicate your plans, including dates, for the following programs: Technical assistance through the States for local government renewable resource programs, institutional buildings conservation programs, and low-income weatherization.

Mr. JOHNSON. BPA expects to develop a draft proposal for implementing low-income weatherization by the end of March. A final meeting with the States, local social service agencies, and the utilities will be held in early April before we finalize the proposal and enter into contracts with the implementing entities.

I would like to insert in the record our current schedule for offering the technical assistance program and institutional buildings program.

[The information follows:]

### TECHNICAL ASSISTANCE PROGRAM EVENT SCHEDULE

1. RFP solicitation to the States on February 22, 1982.
2. Area meetings soliciting input from utility representatives, local government officials, and others will be completed by March 11, 1982. Information received will be incorporated into the States' responses to the RFP.
3. The States' responses to the RFP are due March 29, 1982.
4. Reviews, evaluations, and all negotiations with the States are to be completed by April 16, 1982.
5. Internal review by BPA procurement to be completed by April 16, 1982.
6. Agreements to be signed by April 16, 1982.

## INSTITUTIONAL BUILDINGS PROGRAM EVENT SCHEDULE

March 1-4—Delineate issues, write issue papers where appropriate.

March 5-8—Make key program decisions.

March 9-12—Write draft program description; begin drafting contract.

March 12-17—Circulate description internally for comment.

March 18-19—Revise program description.

March 22—Send invitations and program description out for second regional meeting to be held April 8.

April 8—Hold regional meeting.

April 8-18—Comment period for meeting attendees.

April 19-23—Revise program description and contract.

April 30—Send out invitations and draft contract to States for negotiation session to be held May 24-26.

May 24-26—Negotiate contract with States.

June 1-July 15—Develop program notebook and administrative procedures.

June 22-23—Conduct final contract negotiation with States.

July 15-August 1—Internal BPA review process.

August 1—Offer contracts.

## COMMERCIAL AND INDUSTRIAL SECTOR PROGRAMS

Chairman HATFIELD. BPA has only a limited commercial program at this time and no program in the industrial area. Please describe your plans and the dates for starting the proposed programs in these sectors.

Mr. JOHNSON. BPA is designing a regionwide, commercial buildings energy audit program for implementation in fiscal year 1982. Industrial buildings, exclusive of process activities, may also be included. The program will stimulate conservation by providing end-use consumers with reliable information concerning energy efficiency improvement opportunities. BPA plans to negotiate and offer a contract for the program to our utility customers by summer 1982.

A commercial sector financial incentives program is being planned as a followup to the energy audit program. Specifics are not yet available. This program will be offered shortly after the offering of the energy audit program.

In the industrial sector, BPA plans to offer targeted solicitations in several areas where significant conservation potential has been identified. Currently, the Office of Conservation is coordinating with other organizations within BPA to identify programs and end-uses that will lead to conservation savings in the industrial sector. The areas to be targeted are being identified now. It is expected that the solicitations will begin to be offered in early fiscal year 1983.

## INVESTOR-OWNED UTILITY PARTICIPATION

Chairman HATFIELD. All of the investor-owned utilities in the region have signed exchange contracts with BPA, but none have yet signed requirements contracts. BPA is ruling that because they have not signed requirements contracts, the IOU's and their customers are not eligible for billing credits, conservation programs, and other assistance by BPA to promote conservation and renewable resources. While the contracts issue itself is complicated and may yet be resolved, this uncertainty is hampering the ability of citizens in 80 percent of the States served by IOU's to benefit from BPA programs. Please explain in detail BPA's rather inflexible position on this issue, and have you reevaluated this position in light of technical analysis developed by IOU's which seems to demonstrate that conservation for utilities with exchange contracts does result in energy savings and economic savings for the Administrator?

Mr. JOHNSON. We have examined the IOU's technical analysis, and it seems to demonstrate that conservation for utilities with exchange contracts results in energy and economic savings. Our position, however, remains unchanged.

I believe that Congress provided the Administrator with the authority to acquire conservation and generating resources so that the Administrator would be able to serve the increasing firm power loads which will be imposed on Bonneville because of the Regional Act.

The obligation to serve these firm power loads is not the same as the Administrator's obligation to serve the rural and residential loads of utilities that have only signed an exchange contract. The exchange obligation is contingent upon the customer providing the necessary power to Bonneville to serve the load. In addition, I believe the Administrator's obligation to purchase the power offered by exchange customers was envisioned to be a blind obligation in order to allow exchange customers the freedom to develop their own resources and operate their own systems as they saw fit.

The eligibility position I have outlined serves to support and implement the coordinated regional resource planning and pooling system which was intended by Congress in the Regional Act. I believe that the benefits of BPA's regional conservation funding should flow only to those utilities which have opted to join that system by accepting the provisions of the power sales contract related to system planning and resource operation. There may be economic benefits which would flow to certain utilities by adopting a different position on eligibility, but I do not believe that that would serve to establish the coordinated regional system intended by the Regional Act. Instead, it would allow utilities to obtain the benefits of coordinated planning and regional financing without shouldering the responsibilities.

Preeminent among those responsibilities are allowing the Council's regional plan to operate in meeting the region's load growth, shouldering the full environmental costs and benefits of our power decisions, achieving conservation as the resource of first reliance, living up to the priorities given renewable and high-efficiency resources, paying the costs of the regional fish and wildlife mitigation and enhancement plan, and adding resources to the region's capability in a coordinated and efficient fashion. The requirements contracts buy into these responsibilities. Any utilities deciding to go it alone—to operate outside of the regional plan and avoid these obligations—cannot also demand the benefits of the regional planning and resource acquisition program, including the conservation programs.

Because utilities have until August 28, 1982, to decide whether to sign firm power requirements contracts with BPA, the short-term, or interim, conservation contracts provide flexibility for a utility to participate in the BPA conservation programs immediately, even in the absence of signed requirements contracts. Any participating utility which subsequently elects not to become a requirements customer of BPA would, under the short-term conservation contracts, then be obligated to make the equivalent power saved and paid for by BPA's customers available to BPA. In that event, the ratepayers of the nonsigning utility would pick up the costs of the conservation which occurred in their service area. This should present no undue economic obstacle, as the conservation measures in question, if cost-effective to BPA shopping for power for the regional system and looking at high marginal costs of new generation, will also be cost-effective to any utility which elects not to be part of this system and face the same, or very similar, high marginal costs for the alternatives to conservation.

## WPPSS PLANT 3

Chairman HATFIELD. Do you share the uneasiness of some in the region that power from WPPSS 3 may be surplus to the region's needs? If it is excess to our needs, in your opinion, will there be another market for the power?

Mr. JOHNSON. Bonneville is currently developing its first regional forecast of loads and resources. This forecast will give a range of possible high- and low-load growth estimates to depict the uncertainty with which regional power planners will have to deal in making power supply plans. This forecast will tell us the risk we may or may not face on need for additional resources, including resources currently under construction, such as WNP No. 3.

Should it appear that WNP No. 3 or other Bonneville resources may be surplus to our needs for a period of time, then we will need to assess the economic alternatives for those resources. One such alternative would certainly be to market the power of such a resource until we need it to meet our own loads. We are unable to form opinions on these subjects as our studies are still underway. The forecast and our assessment of any marketing potential will be completed by early April.

## WPPSS PLANT 2

Chairman HATFIELD. I am advised that there are some questions being raised regarding safety and design of WPPSS 2 which could affect its future operation. Would you comment?

Mr. JOHNSON. We are currently unaware of any significant design, safety, or licensing problems at supply system project 2 that have not been dealt with to the Nuclear Regulatory Commission's satisfaction. The Nuclear Regulatory Commission recently reviewed and approved the management plan for project 2. The project schedule, with a February 1984 commercial operation date, was also reviewed and the Nuclear Regulatory Commission maintained the project's position on its licensing docket in support of that commercial operation date.

## BILLING CREDITS

Chairman HATFIELD. Section 6h of the act provides for billing credits to customers for conservation programs or resources sponsored by the customer or political subdivision served by the customer. I understand that Bonneville will soon publish proposed rules for implementing the billing credits portion of the act. Does the proposed rule make the benefit of billing credits broadly available to sponsors of conservation programs and renewable resources or has Bonneville restricted the availability of billing credits in the proposed rule?

Mr. JOHNSON. BPA's proposed billing credits policy, based on our interpretation of the requirements of the Regional Act, restricts the availability of billing credits to BPA customers which implement conservation programs or develop resources which enable them to reduce their loads on BPA and thus reduce BPA's obligation to acquire resources.

Chairman HATFIELD. How does the proposed rule encourage the use of billing credits?

Mr. JOHNSON. BPA's proposed billing credits policy is intended to provide an incentive for local initiative in meeting loads through conservation and other types of resource developments as an alternative to BPA's direct acquisition of resources. This is accomplished by basing billing credits for conservation activities on BPA's cost of alternative resource acquisitions. To the extent that a customer can implement a conservation activity at less cost than BPA's alternative cost, it can realize a financial gain. This may prove to be a significant incentive. For resources other than conservation, the billing credit will be based upon the net cost of the resource, but with BPA's alternative cost as an upper limit.

Chairman HATFIELD. I understand that the preliminary proposed rule includes what is called a negative billing credit where, under certain circumstances, rather than the Administrator paying a customer for the billing credit, the customer would actually have to pay money to Bonneville. Isn't this true that this would provide a significant disincentive for customers to sponsor renewable resources and multipurpose projects for the right to obtain a billing credit?

Mr. JOHNSON. The rationale for the negative billing credit is that it is necessary to comply with the provision of section 6(h)(4) of the Regional Act, that power rates charged other customers never be adversely impacted as a result of granting a billing credit for a resource other than conservation. The reason a billing credit for such a resource may become negative is that the BPA power rates may exceed the cost of the billing credit resource at some time in the future. The billing credit, of course, is in lieu of BPA acquiring an alternative resource. Consequently, had BPA acquired an alternative resource in lieu of granting the billing credit, and that alternative resource was less costly than the future BPA rate level, it would be contributing to keeping the rate level lower than it would be in the absence of that resource. There must be a negative billing credit for such a resource, therefore, to assure that the future rate level will be no higher as a result of granting the billing credit than to what the rate level otherwise would be if BPA acquired an alternative resource.

Chairman HATFIELD. I understand under the preliminary proposed billing credit rule that only those customers that sign a new power sales contract will be eligible for billing credits. If customers who elect to retain their existing power sales contracts are not eligible for billing credits, isn't it true that billing credits will not be any incentive for such customers to implement conservation programs or develop resources?

Mr. JOHNSON. If a customer elects to retain an existing power sales contract and is thus not eligible for billing credits, it will be true that billing credits will not provide any incentive for that customer to implement conservation programs or develop resources. However, there will be other incentives. The existing power sales contracts for all customers with net power requirements exceeding 25 average megawatts are subject to the notice of power insufficiency previously issued by BPA. BPA has no obligation to serve their load growth, and such customers will have to assume that responsibility. To the extent their requirements will exceed the power allocation their contracts will entitle them to from BPA, they will have a powerful incentive to implement conservation programs and develop resources to meet their own needs.

Chairman HATFIELD. Under the billing credits portion of the act, the Administrator is to provide customers with the billing credit that represents the cost of resources that the Administrator would have otherwise had to acquire had the customer not sponsored the conservation program or resource. I understand that under Bonneville's preliminary proposed rule for implementing the billing credit portion of the act, the method to be used to establish the cost of resources the Administrator would have otherwise acquired is an average of the costs of all resources the Administrator actually acquires in a given year. The average cost of resources acquired in a year will necessarily be less than the highest cost of certain resources acquired in a year. Doesn't such a proposal for establishing the alternative cost of resources necessarily mean that a customer may get less for a resource under billing credits than such customer would have received if the Administrator would have acquired the resources?

Mr. JOHNSON. The initial position BPA adopted for determining alternative costs could have that effect. This was among the reasons BPA is now proposing a different alternative cost methodology based upon the weighted average cost of all regional resources used to serve BPA customers' load growth without regard to whether BPA acquires such resources. Conservation programs costing less than the average of the generating resources utilized will be excluded from the calculation. We believe this methodology should avoid the problem you describe.

## QUESTIONS SUBMITTED BY SENATOR MCCLURE

### NORTHWEST POWER ACT

Senator MCCLURE. Do you feel that the Northwest Power Act mandates the kind of extensive conservation program you have outlined?

Mr. JOHNSON. Yes, BPA believes the conservation program it has proposed complies with mandates of the Regional Act. In section 6(e)(1), the act very clearly requires the Administrator to acquire cost-effective conservation resources to the maximum extent practicable. Section 6(a)(1) requires the Administrator give first priority to cost-effective conservation in acquiring the power resources to meet the Administrator's load. The benefits of conservation acquisitions must be distributed equitably among the customer classes throughout the region, per section 6(k). Moreover, section 6(a)(5) requires the Administrator to acquire conservation and renewable resources installed by residential and small commercial consumers regardless of the need for power.

BPA has actually proceeded in a conservative, businesslike manner in designing and implementing conservation programs. Initial programs focus primarily on low-cost, high-potential measures. Since several utilities in the region already had experience in the residential sector, and such sector represented a major end-use of electricity affecting the greatest number and geographic spread of consumers among the several sectors and classes, residential programs were a logical and effective first step. BPA is now gradually expanding its residential programs and planning to begin addressing the high savings potential of areas of the commercial and industrial sectors. BPA believes this careful, incremental approach to conservation is the way to insure conservation programs which provide the greatest amount of savings at least cost to the ratepayers.

### CONSERVATION

Senator MCCLURE. Does your conservation program contemplate direct payments to individuals or businesses for taking certain conservation steps?

Mr. JOHNSON. Our programs purchase energy savings from individuals, businesses, and government or nonprofit entities. Thus, we pay end-users of electricity to install energy-saving measures.

In most programs, payments are made through a third party rather than directly from BPA to the end-use consumer. Typically, this is a utility or government entity, as required by section 6(e)(2) of the Regional Act. This section requires BPA to make maximum practicable use of customers and local entities to implement conservation with end-use consumers.

The payment is based on the energy savings, or load reduction, experienced by BPA, although it may not exceed the cost of the measures. For example, under one option of the regionwide weatherization program, the consumer receives 29.2 cents/annual kWh saved as a result of the measures installed. Total payment cannot exceed the cost of all measures installed in the house, but typically does not cover the full cost. The economic value of these savings to BPA is always greater than the payment to the consumer.

Senator MCCLURE. If so, what consideration is given to the need for such assistance; that is, are the recipients of such assistance only those who are financially unable or actually unwilling to take these measures without the incentives you propose?

Mr. JOHNSON. BPA does not look at such purchases as assistance. BPA does not include a social goal in its planning. The decision to purchase is made on the basis of the Administrator's need for power and the cost-effectiveness of the conservation to be purchased. The financial circumstances of individual consumers is not a consideration, unless such circumstances function to block BPA's access to a cost-effective resource, in which case we would consider taking extra steps among that class of user, as we intend to do with a low-income component to our residential weatherization program.

BPA recognizes that individuals, businesses, and government or nonprofit entities make decisions to install conservation measures in accordance with their own immediate economic circumstances. The individual consumer pays melded rates, which do not reflect the full cost to BPA of additional power. BPA purchases energy savings from consumers who invest in measures to reduce their electricity consumption by offering them an incentive to act as if they, too, were facing the very high marginal costs of new electricity.

If the level of incentive payments were inadequate in the context of the end-users' financial circumstances, BPA would have to reevaluate its payment level in order to achieve adequate penetration of our programs.

Senator MCCLURE. Are those who receive the conservation investment from BPA realizing an economic benefit in excess of the cost of the conservation measure?

Mr. JOHNSON. As I have stated, the cost of the measure provides a ceiling on BPA's payments to conservation program participants. However, the economic benefit to the consumer arises from reduction in his utility bills. This must, of course, be seen by the consumer as greater than his economic cost, or he will not participate in BPA's program. In those instances where BPA payments happen to cover full costs, this is never a problem, as payback to the consumer is total and immediate. Where the consumer is making a personal financial contribution, the economic benefit must be large enough that he can see payback in a very few years.

Senator MCCLURE. Do the ratepayers who are providing the conservation investment achieve a comparable economic benefit; that is, is the cost-benefit ratio of the conservation expenditure sufficient to make it a sound public policy decision.

Mr. JOHNSON. Yes, absolutely. The Regional Act requires that BPA invest ratepayers' money only in the most cost-effective resources. So, BPA may only acquire conservation resources that meet loads more cost-effectively than other resources available to meet the same loads. In fact, many of the existing conservation programs are extremely cheap and provide bargain power for the other ratepayers on the system. The residential weatherization program, for example, provides load reduction at less than 20 mills/kWh. This compares very favorably with the 69 mills per kilowatt-hour figure which was calculated to be Bonneville's long-run incremental cost for generating resources in 1981. All current and proposed conservation programs are substantially below this 69 mills per kilowatt-hour figure.

Rather than using a classical benefit-cost analysis when evaluating a conservation program and when comparing it to various other resources, BPA uses an approach more directly applicable to electric power and more familiar to power people. It is a cost-of-the-power-purchased approach. A levelized energy cost calculation is used to determine an appropriate time-adjusted measure of relative cost per kilowatt-hour for each program. Front-end program costs are spread out over the expected measure life using an amortization factor and then divided by the expected average annual energy savings. These program levelized costs are compared to BPA's alternative cost of acquiring new generating resources to assure cost-effectiveness of the programs. In benefit-cost parlance, one could consider this alternative cost as the benefit to BPA of having to incur the conservation program cost.

The cost-effectiveness of BPA's current conservation programs varies from 0.2 mills/kWh to 31.6 mills/kWh. As I mentioned earlier, the cost of the alternative generating resource has been estimated to be 69 mills/kWh. In terms of a benefit-cost ratio, the benefit of conservation programs would be the avoided cost, or 69 mills/kWh, divided by the average cost of conservation programs, or 19.1 mills/kWh. This yields a benefit-cost ratio of 3.6, confirming the soundness of BPA's conservation acquisitions.

Senator MCCLURE. If the cost of a conservation measure is paid by the ratepayers, are their rates lower or going to be lower than they would have been had the same investment been made in purchasing new generation capacity instead?

Mr. JOHNSON. The conservation resources that are currently being acquired are much cheaper than the alternative generating resources, so the revenue requirement associated with them is much less. BPA must raise the required revenue through rates. The rate impact of conservation is less than the rate impact of new generation, unless the conservation costs become close to the new generation costs, in which case the rate impact of the conservation could be slightly higher than the impact of the generation, due to the fact that the cost of the conservation must be recovered in the sales of fewer kilowatt-hours. Even so, the lower revenue impact with conservation always means that less money is being pulled out of the pockets of the people of our service territory.

Senator MCCLURE. Shouldn't the costs of the conservation programs you are proposing be borne by those conserving, at least up to the amount of their economic benefit?

Mr. JOHNSON. If you eliminate the economic benefit, by having the consumer shoulder costs equal to those benefits, you eliminate the incentive to cause such consumer to deliver BPA a power resource that is of great economic benefit to the region's ratepayers. The ratepayer benefit fully justifies, of course, the amount of any payment BPA may make to a consumer to get him to take the desired action, a payment which then purchases the conservation resource. BPA believes in the soundness of its decision to structure its payment to whatever size is cost-effectively justified to obtain the resource, and to discount concerns about undue benefit to consumers. In this marketplace of power resources, consumers of electricity have a resource, and BPA is willing to buy it if it is the most cost-effective option available.

Senator MCCLURE. How is it possible to measure the amount of incentive necessary to achieve conservation goals considering that individuals have differing capabilities to take these conservation measures on their own?

Mr. JOHNSON. BPA recognizes the difficulty of accurately determining the incentive level to encourage widespread consumer participation, without setting it lower at first than required to elicit that response. While individuals do have differing capabilities to install conservation measures, BPA will only consider individual income levels as they may impact on penetration rates. Marketing studies we now have underway should help us set the programmatic incentive levels in the future.

Senator MCCLURE. When considering the overall conservation program as a purchase of energy resources as you suggest, would the level of such a purchase contemplated by the program not reach that which would require further congressional approval?

Mr. JOHNSON. As prescribed by section 6(c)(1) we are viewing the acquisition of a specific measure by contract with an individual utility to constitute a proposal—to implement a conservation measure. Measures—for example, ceiling insulation, floor insulation, water heater wraps, and shower flow restrictors—are grouped into program areas such as home energy efficiency in the budget proposal for ease of presentation and administration. Distinguishing between individual utilities is necessary because each utility makes an individual decision to offer a conservation measure. Therefore, each time a utility agrees to offer a conservation measure under a contract, it is a resource acquisition agreement.

We expect that no utility will have an individual measure under the proposed conservation programs that approaches the 50 MW major resource definition.

It appears reasonable to view savings in this fashion rather than an aggregate total for all utilities. To do otherwise would lead to the conclusion, for example, that acquiring output of three 20 MW wood-fired cogeneration plants from three different utilities would constitute a single major resource.

Senator McCLURE. What is the impact of the conservation program you have outlined on the vrious utilities in the region?

Mr. JOHNSON. The conservation program BPA proposes will provide financial and technical assistance to those utilities and other entities who participate. This will assist them in initiating or expanding existing conservation programs. These programs provide an energy resource at a lower cost per kilowatt-hour than more expensive alternative resources. Over the long term, this will reduce the revenue required by the utility to meet load growth. In addition, due to the high consumer acceptance of conservation, participation in BPA's conservation programs will foster a positive image for the utility.

## WESTERN AREA POWER ADMINISTRATION

### STATEMENT OF ROBERT L. McPHAIL, ADMINISTRATOR

Chairman HATFIELD. Mr. McPhail, we are ready to hear from you.

I want to say all the reports I have, over the years, confirm the fine work you are doing at WAPA. Again, it is worthy to commend you for an extraordinary fine job that you are doing—your difficulties are unique.

I want to reaffirm our confidence and trust in your leadership.

Mr. McPHAIL. Thank you, sir. It is a pleasure to appear before your committee today and present the 1983 budget for the Western Area Power Administration.

#### PREPARED STATEMENT

With your permission, I would like to submit my detailed statement for the record and just quickly summarize.

Chairman HATFIELD. It will be printed in the record.

[The statement follows:]

## STATEMENT OF ROBERT L. MCPHAIL

Mr. Chairman, I am Robert L. McPhail, Administrator for the Western Area Power Administration (Western). It is again a pleasure to appear before this subcommittee to support the President's FY 1983 budget request. With your permission, I will summarize the major program areas in our 1983 budget request and discuss some of our accomplishments during this past year. I will be pleased to respond to questions on our activities and programs.

SUMMARY 1983 OF BUDGET REQUEST
(Dollars in thousands)

| Fund | 1982 | 1983 | Change |
|---|---|---|---|
| Construction, Rehabilitation Operation and Maintenance | $210,774 | $207,200 | $-3,574 |
| Emergency | 500 | 500 | -0- |
| TOTAL (BA) | $211,274 | $207,700 | $-3,574 |

Western's appropriation request for 1983 is $207,700,000, a decrease of $3,574,000 from the 1982 amount of $211,274,000. The summary above shows that our FY 1983 request is a slight overall reduction from the FY 1982 level, primarily due to reduced purchase power and wheeling funds for the Central Valley Project in California. This reduction is brought about by the expiration, in December 1981, of Western's contract to purchase capacity and energy from the Centralia plant in Washington state and the requirement to utilize the lower cost energy banked with the Pacific Gas and Electric Company (PG&E). Pursuant to our contract, PG&E is required to supply energy whenever Western produces less energy than the Central Valley Project requires. This banked energy, is withdrawn at 2.8105 mills per kilowatthour (mills/kWh) from our Energy Account No. 1 in accordance with the contract. This rate is a bargain, particularly when open market purchases by Western presently would cost 30 to 35 mills/kWh. Based on the present rate of withdrawal, the account will be exhausted by 1985.

In FY 1983, we are requesting $103,000,000 under the Construction, Rehabilitation, Operation and Maintenance Fund for construction work, an increase of $1,600,000 over the 1982 amount; $58,200,000 for operation and maintenance activities, an increase of $2,026,000; and $46,000,000 for the purchase power and wheeling program, a decrease of $7,200,000. Specific activity dollar amounts of this fund are as follows:

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE FUND
(Dollars in thousands)

| Activity | 1982 | 1983 | Change |
|---|---|---|---|
| Construction and Rehabilitation | $101,400 | $103,000 | $+1,600 |
| Systems Operation and Maintenance | 56,174 | 58,200 | +2,026 |
| Purchase Power and Wheeling | 53,200 | 46,000 | -7,200 |
| TOTAL | $210,774 | $207,200 | $-3,574 |

## CONSTRUCTION AND REHABILITATION

Our project components of the construction and rehabilitation request of $103,000,000 are:

|  | 1982 | 1983 | Change |
|---|---|---|---|
| Central Valley Project | $9,120,000 | $9,643,000 | $+523,000 |

This request provides $2,520,000 for award of contracts for improvements to increase Keswick Switchyard reliability; $3,090,000 for various maintenance facilities; and $3,533,000 for continuation of ongoing work for power system modifications and additions. Included also in the request is $500,000 for planning and environmental studies. These funds will allow participation in a feasibility study to be conducted in a cooperative effort with area utilities for increasing transmission capacity from New Mexico to California. This study would help to determine whether additional transmission capacity totaling about 1000 megawatts is needed by various utilities in this area and would provide Western a cost effective link to deliver capacity and energy to the Central Valley Project to replace a portion of the Centralia Thermal Project generation.

|  | 1982 | 1983 | Change |
|---|---|---|---|
| Colorado River Storage Project | $39,510,000 | $46,653,000 | $+7,143,000 |

The budget amount for this project includes $29,900,000 for Western's share of continuing joint construction of 345-kV transmission facilities in western Colorado. The work consists of construction of about 288 miles of double circuit, 345-kV transmission line and associated facilities from Rifle, Colorado, to San Juan/Shiprock, New Mexico.

This request will also provide $11,000,000 for continuing work on uprating our existing 98 mile Craig to Rifle 230-kV line to 345-kV. These two efforts will increase the capability of the Federal transmission system to transmit power and energy for loads, interchanges, and oil conservation. They will also improve system reliability and significantly reduce transmission system losses. Western's transmission system losses will be decreased 175 million kilowatthours annually, which has a benefit of $5.25 million. We expect this monetary benefit to increase as the cost of energy increases.

There has been a recent development that may impact the construction scheduling of the Rifle, Colorado to San Juan/ Shiprock, New Mexico line. The Public Utilities Commission of Colorado has issued a decision which is expected to delay this facility several months. While Western as a Federal agency is not directly bound by the Commission's ruling, the Colorado-Ute Electric Association, which is the construction agent for the line, is subject to the Commission's jurisdiction. I would like to point out that the need for these facilities was identified by an area-wide planning group which included all major utilities, both public and private, so the facilities are part of a regionally coordinated plan.

Other major project items in our request include $1,510,000 for the addition of a 250 MVA, 230/138-kV autotransformer at Flaming Gorge Switchyard, and $2,053,000 for joint financial participation in construction of the Hayden-Blue River, Colorado, 345-kV transmission line. Planning and environmental studies, energy efficiency modifications to existing facilities, equipment purchases,and miscellaneous additions will be continued for $2,190,000.

| | 1982 | 1983 | Change |
|---|---|---|---|
| Pacific Northwest-Pacific Southwest Intertie Project | $775,000 | $800,000 | $+25,000 |

Western is requesting $800,000 for continuing engineering studies, contract negotiations, rights-of-way acquisition, and environmental analysis. Plans to develop and construct intertie facilities between the Dalles, Oregon, Mead Substation in southern Nevada, and the Phoenix, Arizona area remain on hold, pending the outcome of intra-regional studies.

However, a ± 500-kV, direct current transmission facility between Mead Substation and Phoenix is being developed as part of the intertie project. This major new transmission facility would be jointly developed by the Salt River Project in Phoenix, Arizona, the Southern California Public Power Authority, comprised of 11 municipal interests in southern California, and the Western Area Power Administration. This development would be primarily financed by non-Federal sources, and would reinforce existing projects and provide increased capacity for power and energy exchanges between the two areas. It will be approximately 240 miles long, and capable of carrying 2200 megawatts of power.

| | 1982 | 1983 | Change |
|---|---|---|---|
| Pick-Sloan Missouri Basin Project | $33,997,000 | $30,793,000 | $$-3,204,000 |

The request provides $12,563,000 for continuing contract earnings payments, construction inspection, and contract administration for the Miles City ac.-dc.-ac. Converter Station and associated facilities. These facilities are being built under a joint construction and financial arrangement with Basin Electric Power Cooperative and will connect east and west transmission systems. Our engineering design and specification work is currently well underway on this converter station with award of contract scheduled in the summer of 1982 and completion in the fall of 1984. The converter station will provide the means to relieve major local operating problems and improve system reliability as well as provide transfer capability for diversity, short-term energy exhanges, and increased oil conservation. Recently, the North American Electric Reliability Council (NERC) reported that utilities in the Western United States must still depend on substantial amounts of oil-fired generation while Midwestern systems have coal-fired surpluses even after replacing their oil generation. Therefore, we believe additional east to west transfer capability by construction of this intertie is vital to transmit coal-fired energy surpluses to offset oil-fired generation needed by Western to meet Central Valley Project obligations. Another significant benefit of this interconnection is that a firm path will be established to balance load and resource obligations of non-Federal power suppliers that serve customers on both sides of the east/west separation.

In addition, $1,750,000 is requested for completion of the installation of communication and supervisory control equipment for the Loveland-Fort Collins Power Marketing and Operations complex; $2,500,000 for the construction and installation of transformers and breakers at White Substation; $1,120,000 for work on the Sidney Substation direct current intertie additions; and $11,760,000 for various substation reliability additions and other power and transmission system modifications to existing facilities.

Also, $1,100,000 is provided in the request to complete engineering, environmental studies, and designs on the Great Falls-Conrad 115-kV transmission line.

| | 1982 | 1983 | Change |
|---|---|---|---|
| Transmission System Improvement Program | $17,233,000 | $15,111,000 | $-2,122,000 |

The request will provide for continuing replacement and rehabilitation of deteriorated wood-pole transmission structures, reconditioning and/or replacing inadequate steel structures, and for upgrading substations, switchyards and other facilities.

Western has 8,400 miles of 69-kV through 230-kV wood-pole lines. Of this total, 2,300 miles are over 35 years old; 1,600 miles are from 25 to 29 years old; and 700 miles are 20 to 24 years old. The nominal life of a wood-pole structure is 35 years, but with proper treatment at 15-20 years and again at 30-35 years, it is possible to extend the "life" to 55 years.

During the period FY 1979 through 1981, Western has inspected and treated 2,400 miles of lines, or 28 percent of the total miles of wood-pole transmission lines. In addition, 3,200 wood-poles were replaced during that same period. We plan to inspect and treat an additional 800 miles of lines in FY 1982 and 350 miles of lines in FY 1983.

In FY 1983, major work emphasis will be directed towards upgrading the Thermopolis-Alcova, Wyoming, transmission line and terminal facilities, for $2,343,000; upgrading the Liberty-Coolidge and Coolidge-Saguaro transmission facilities in Arizona, for $2,425,000; and $10,343,000 for improving the reliability of transmission lines and substations throughout Western's power systems. System studies and data collection to support future system upgrades will continue.

## REIMBURSABLE CONSTRUCTION

Western, under reimbursable arrangements with the Bureau of Indian Affairs, is to provide the power supply for the pumping requirements for the Ak-Chin Water Supply Project in central Arizona as authorized by the Ak-Chin Water Rights Settlement Act.

A reconnaissance study has found Vekol Valley to be the best potential ground water supply area with the least adverse environmental and social impacts associated with well field development. It is anticipated that a 115-kV overhead transmission line will be extended from Western's Maricopa Substation to transmit the power to the well field. These power facilities are scheduled to be in service in January 1984.

## SYSTEMS OPERATION AND MAINTENANCE

Our FY 1983 request for system operation and maintenance totals $58,200,000, an increase of $2,026,000 from 1982. This request will provide for operation and maintenance expenses on high voltage transmission lines, associated substations, communication facilities, and for power marketing activities on 10 power systems. Western's other power systems are included in the Colorado River Basin's Power Marketing Fund.

Of the total request, $48,941,000, is for operating expenses for classified and wage board employees, travel and transportation, rents, communications, utilities, materials and supplies, data processing, administrative, and other general expenses. This request includes $852,000 for continuing customer-oriented activities under the Energy Conservation and Renewable Resources program.

Our systems replacements and additions request totals $9,259,000 and reflects a decrease of $4,253,000 from 1982. The decrease is due mainly to completion of substation rehabilitation work and acquisition of work equipment in 1982. In FY 1983, our request for system replacements and additions provides $1,867,000 for continuing purchases of mobile and work equipment which meets replacement criteria and are critically needed to maintain Western's electric power systems; and $6,416,000 for improving system reliability and operational efficiency through purchase of telemetering, supervisory control, radio and protective relaying equipment, circuit breakers, transformers, and through replacement and disposal of devices containing polychlorinated biphenyl. Additionally, $976,000 provides for various maintenance and warehouse facilities for line crew work space, storage of materials warehouse facilities for line crew work space, storage of materials and supplies, and storage of electrical and transportation equipment.

PURCHASE POWER AND WHEELING

The FY 1983 budget request for purchase power and wheeling is $46,000,000, a $7,200,000 decrease from the amount in FY 1982. This request will provide for the purchase and wheeling of power under existing contractual commitments and for participation in the oil conservation program. This oil conservation program will allow for integration of hydro and thermal generation in order to achieve the most economic use of resources to meet total area load within the limits of water and transmission system constraints.

The decrease of $7,200,000 is primarily attributed to a decrease in cost for energy purchases for the Central Valley Project (CVP) in California. In FY 1983, Western plans to purchase almost 2.5 billion kilowatthours at 2.8105 mills/kWh from its Energy Account No. 1, "banked" with Pacific Gas and Electric (PG&E). Western expects that this energy bank account will be depleted by FY 1985, and subsequent purchases of 2.5 billion kilowatthours annually from Energy Account No. 2 will be at substantially higher prices because they must be based on PG&E Company's thermal and nuclear costs. This change in power source is the result of the Centralia Thermal Project contract expiration in December 1981. The Centralia arrangement was initially established for a 10-year supply with possible longer term renewals, which have not developed. The present estimate of the charge for withdrawals from Energy Account No. 2 in FY 1985 is about 55 mills/kWh and will escalate to 75 mills/kWh by 1988. Thus, we are faced with the major problem of obtaining energy for CVP in the near future with total costs of wheeling, capacity, and energy expected to range from $150 to $200 million annually.

Western is exploring various arrangements which could reduce this annual purchase power budget. Currently, we are looking at possible arrangements to import coal-fired energy into the CVP system to meet our obligations at a cost which would be somewhat less than the cost of energy from PG&E Company oil-fired plants.

One option would involve contractual arrangements with one or more CVP customers whereby the customer would purchase energy from a supplier and deliver it to Western for transmission to the CVP and distribution to CVP customers. In return, Western would give a credit on the purchaser's bill for the amount paid for the power delivered to Western. Under this arrangement, Western would maintain the operational responsibility and the obligation to deliver the energy to the CVP customers, and the customers would make payment directly to the supplier.

Western has discussed this procedure with its CVP customers and the reaction has been favorable. Work is underway on drafting the required documents to enter into such an agreement. Such a program could reduce the CVP purchase power budgetary outlays by approximately 50 percent in 1985 and later years.

Another option under consideration is joint purchase arrangements with the Modesto Irrigation District and the City of Redding, California, to obtain a long-term supply of power from the Palo Verde Nuclear Powerplant near Phoenix, Arizona.

Also included in Western's FY 1983 purchase power and wheeling request is approximately $4,000,000 to continue participation in the oil conservation program. This program activity will result in estimated conservation savings of about 1,000,000 equivalent barrels of oil in FY 1983. Revenues realized from these onpeak sales will appreciably exceed the cost of purchased energy. For each dollar spent, we gain about two dollars in return under this program.

## ENERGY EXCHANGES

As mentioned in last year's FY 1982 budget testimony, Western has an existing Letter of Understanding with the Canadian Province of Manitoba's Electrical Energy Marketing Committee to study and pursue a definitive contract for a long-term bulk power and energy sale/purchase arrangement. There has been essentially no Western activity on the Manitoba proposed 1,000 megawatt, 21-year sale since October 1980. At that time, Western was informed that the possible sale arrangement could not be pursued further until the Manitoba-Saskatchewan-Alberta "East-West Transmission Study" was concluded. This study has since been completed, but is still awaiting disposition by the respective Premiers of the three Canadian provinces.

Western is also involved in several other hydrological studies that could have a positive impact on its power marketing program during FY 1983. These studies may provide opportunities for possible energy exchanges outside of Western's service area that would benefit the general public. Included in these efforts is a joint Hydrological Diversity Investigation with the Bonneville Power Administration, an Energy Exchange Appraisal Study with the Southwestern Power Administration, and a Hydrothermal Integration Study with some of Western's customers.

## COLORADO RIVER BASINS POWER MARKETING FUND

## OPERATING EXPENSES

Western's FY 1983 estimate under this revolving fund is $94,400,000 (obligational authority) for power marketing and transmission expenses. This represents an increase of $1,000,000 from FY 1982. All costs associated with the operation and maintenance of the Colorado River Storage Project, the Fort Peck Project, and the Colorado River Basin Project including expenses of the

Bureau of Reclamation and the Corps of Engineers are paid directly from power revenues collected by Western from the revolving fund Projects. Revenues above actual operating expenses are returned to the United States Treasury to repay Federal investments. The increase from FY 1982 is primarily due to increased operating expenses for continuing reconstruction work on the 188-mile Fort Peck to Havre, Montana, 161-kV transmission line.

| | 1982 | 1983 | Change |
|---|---|---|---|
| Colorado River Storage Project | $84,563,000 | $79,057,000 | $-5,506,000 |

In 1983, $11,215,000 will be used to cover project expenses associated with power system operation and maintenance; $60,320,000 will provide for purchase power and wheeling contractual commitments which reflects a change from FY 1982 due to a reduction in our continuing participation in the oil conservation program; and $3,200,000 will be used for paying interest accrued on investment.

Additionally, $4,174,000 of this request will be used to cover replacement of substation equipment, obsolete microwave and other communication and control equipment, mobile equipment, and various tools and work equipment. Customer energy conservation and renewable resource activities will require $148,000. We expect to save about 2,000,000 equivalent barrels of oil and increase income appreciably over expenses.

| | 1982 | 1983 | Change |
|---|---|---|---|
| Fort Peck Project | $8,135,000 | $14,532,000 | $+6,397,000 |

This estimate includes $2,632,000, for Corps of Engineers expenses associated with power generation facilities. The Corps of Engineers operates and maintains the power generating facilities, and Western operates and maintains the transmission system and performs power marketing. An additional $11,900,000 will be provided for Western's operations and continued rehabilitation work on the Fort Peck-Havre 161-kV transmission facilities.

| | 1982 | 1983 | Change |
|---|---|---|---|
| Colorado River Basin Project | $702,000 | $811,000 | $+109,000 |

The budget provides for power marketing expenses for the Navajo Project participation agreement and the Central Arizona Project.

## EMERGENCY FUND

Our budget request of $500,000 provides for emergency expenses in the event of unforeseen or unusual conditions causing, or threatening to cause, interruption in power service.

Western is proposing to fund emergencies from power revenues rather than from annual appropriations. To effect this change, the FY 1983 request will initially establish an Emergency Fund of $500,000 which will be replenished as required from project power revenues for which funds were expended on an emergency basis.

## MISSION AND ORGANIZATION

Western is a Federal electric power marketing agency responsible for the delivery and sale of power to over 460 wholesale customers consisting of cooperatives, municipalities, public utility districts, investor-owned utilities, Federal and state agencies, and irrigation districts. These customers provide service to millions of retail power customers in all or part of 15 states; including Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Texas, Utah and Wyoming. Western is responsible for the operation and maintenance of about 16,000 miles of transmission lines, over 200 substations, and various appurtenant power facilities in a 1.3 million square-mile geographical area. Electric power marketed by Western is generated at 47 hydropower generating plants by the Bureau of Reclamation, the Corps of Engineers, and the International Boundary and Water Commission. Western also markets the 546,750-kW United States' entitlement from the Navajo coal-fired plant near Page, Arizona. The current installed generating capacity of these plants is 8,155,318-kW.

The major goal of Western is to provide reliable electric service at the lowest possible cost consistent with sound business principles. Major program objectives are to conduct an ongoing operation, maintenance, and replacement program; plan and manage energy supplies; and to plan, design, and construct facilities to assure a reliable power system adequate to deliver power to customer load centers.

## STAFFING

The FY 1983 budget request provides for 1,293 full-time permanent and 106 other-than-full-time permanent positions to carryout Western's mission. These positions equate to 1,378 full-time equivalents (FTE). The FY 1983 request includes an increase of 26 full-time permanent positions over the FY 1982 level of 1,267 full-time permanent positions.

## OFFICE SPACE

During this past year, the General Services Administration (GSA) delegated authority to the Department of Energy to obtain permanent office space for Western's Headquarters. Subsequently, a lease has been signed and space has been obtained for Western near the Denver Federal Center.

GSA has also accommodated our requests for permanent office space in most Area Office locations.

## POWER RATES

Western is required by law to maintain rates which are adequate to meet the repayment requirements of each project. In order to assure that rates are sufficient, an annual repayment study is prepared on each power project. This study determines if the project rate is adequate to meet repayment of costs allocated to power, and if not, to establish rates which will cover these costs.

Repayment requirements are basically the same for all projects. Essentially, the requirement is to repay, with interest, all costs which are allocated to power facilities, plus annual operation and maintenance expenses including purchase power and wheeling expenses. In addition, most multipurpose projects have a portion of irrigation feature costs which are paid by power revenues. Irrigation costs assigned to be repaid by power revenue are determined at the time the project is authorized and do not require an interest component.

Western, since its establishment in 1977, has implemented rate increases for the Central Valley Project, the Colorado River Storage Project, the Rio Grande Project, and the Parker-Davis

Project. We are currently in the process of completing a rate increase for the Pick-Sloan Missouri Basin Project, and a second increase for the Rio Grande Project, the Central Valley Project and the Colorado River Storage Project. Our rate adjustment action, which is nearing completion for the Rio Grande Project, will put this project on sound financial condition for the first time since 1950. This is possible because the cost of power from alternative sources in the area, which previously served as the base for the rate charged, has now increased sufficiently that this project rate can be raised to repay the project on schedule.

Based on study analysis, rate increases are expected to be initiated in the near future on the Pacific Northwest-Pacific Southwest Intertie Project, and the Parker-Davis Project.

## REPAYMENT

As of September 30, 1981, the investment to be repaid by Western's power systems totaled about $3.7 billion of which $1.3 billion has been repaid. Of the cumulative power revenues of $4.3 billion, $1.5 billion has been used for operation and maintenance expenses, $0.6 billion for purchase power expenses, $0.9 billion for interest, and $1.3 billion has been used for repayment of investment in facilities and assistance to irrigation. The following table summarizes Western's repayment status by projects.

## REPAYMENT STATUS - AS OF SEPTEMBER 30, 1981
(Dollars in Millions)

| | | | Investment Allocated to Power | | |
|---|---|---|---|---|---|
| Project Power System | Cumulative Power Revenues | Cumulative Expenses | Total | Repaid To Date | Unpaid Balance |
| Boulder Canyon | $ 456 | $ 335 | $ 161 | $ 121 | $ 40 |
| Central Valley | 823 | 609 | 750 | 214 | 536 |
| Collbran | 8 | 8 | 15 | 0.3 | 14.7 |
| Colorado River Basin (Navajo) | 300 | 244 | 227 | 56 | 171 |
| Colorado River Storage | 644 | 494 | 688 | 150 | 538 |
| Falcon-Amistad | 13 | 10 | 7 | 3 | 4 |
| Fryingpan- Arkansas | 0 | 0 | 139 | 1/ | 139 |
| Parker-Davis | 278 | 179 | 159 | 99 | 60 |
| Pick-Sloan Missouri Basin | 1,702 | 1,084 | 1,523 | 618 | 905 |
| Pacific Northwest-Pacific Southwest Intertie | 15 | 15 | 45 | 2/ | 45 |
| Provo River | 2 | 1 | 1 | 0.5 | 0.5 |
| Rio Grande | 28 | 28 | 14 | 0.2 | 13.8 |
| Total | $4,269 | $3,007 | $3,729 3/ | $1,262 | $2,467 |

Footnotes:

1/Project not in commercial operation until FY 1982.
2/Project under construction, no repayment to date.
3/To date, 34 percent of investment allocated to power repaid.

### REVENUE AND ENERGY SALES

During FY 1981, Western marketed 37.9 billion kilowatthours of energy to over 460 wholesale power customers resulting in revenues of $383.8 million. This total includes power sales, wheeling for others, and other miscellaneous power revenues. Our FY 1982 estimate for energy sales is 37.0 billion kilowatthours returning revenues of $370.3 million. For FY 1983 energy sales are estimated at 38.0 billion kilowatthours returning revenues of $399.7 million. The decrease from FY 1981 to FY 1982 primarily results from termination of the Centralia powerplant purchases which reduced excess power sales to the Pacific Gas and Electric Company.

The FY 1983 revenue estimates reflect increases principally for the allocation of 102 megawatts of additional power to new customers on the Central Valley Project, California. These contracts are scheduled to be executed and most will begin power service in March 1982.

## OIL CONSERVATION PROGRAM

One of Western's most successful power marketing programs has been to displace oil-fired generation using hydroenergy available through the flexibility and use of large reservoirs. Surplus low cost thermal energy is purchased during the offpeak load period to supply Western's customers; this allows water to be stored in reservoirs for later use. Hydropower is then sold during onpeak load periods at 85 percent of fuel cost or at a split saving arrangement to customers who otherwise would use oil- or gas-fired generation. The success of this program relates directly to the availability of offpeak coal-fired generation to couple with the hydro-system for displacement of oil-fired generation.

For the period December 1972 through September 1981, over 47 million equivalent barrels of oil have been displaced through Western's oil conservation program. In FY 1982 and FY 1983, our goal is to displace an estimated 3 million barrels of oil. This significant reduction, as compared to the FY 1981 effort, is directly related to Western's loss of its power entitlement from the Centralia Power Plant in Washington state which will, in effect, cancel out most of the oil conservation displacement sales from the Central Valley Project marketing area.

From 1972 to 1981 increased revenues to the United States Treasury associated with sales from our oil conservation program have amounted to over $233 million. These additional revenues have the effect of minimizing Western's firm power rate increases.

## CONSERVATION AND RENEWABLE ENERGY

As mentioned earlier, our FY 1983 budget will allow a total of $1,000,000 for continuation of the Conservation and Renewable Energy (C&RE) Program activities. As part of our program activities, Western published its final Guidelines and Acceptance Criteria in November 1981, requiring firm power customers to develop and implement their own individual C&RE programs. We renewed over 200 contracts to date that include specific provisions for customer C&RE programs, and we anticipate additional contract renewals during FY 1983. All of these programs are aimed at conservation and increased energy production from renewable resources.

Western is also continuing investigation of a possible joint venture with industry and its customers of a commercial wind power project that would help satisfy Western's purchase power requirements. Western has had discussions with several customers regarding such a wind farm project and has also received several indications from industry that such a project is both technically and economically feasible.

We have been able to achieve other energy savings by reducing transmission system line-losses, and by installating power-factor correction equipment and energy efficient substation equipment at various locations of Federal power systems.

## POWER MARKETING AND RESOURCES COORDINATION

During the past year Western has made significant accomplishments in the power marketing area. A series of public meetings were completed on the post-1989 marketing plan, for the Eastern Division of the Pick-Sloan Missouri Basin Project. As a result of this new plan, all existing contracts will be extended and contracts for a total of 40 megawatts will be made with 34 new preference customers.

We have recently developed the marketing plan and rates for the Fryingpan-Arkansas Project. The capacity available from this project was allocated to 14 preference customers, of which 12 are new customers. The contracts provide that the customer has the obligation to provide the pumping energy.

During this past year, Western staff, anticipating the impact of substantial preference-owned thermal generation in the Colorado-Wyoming area and its implications, inaugurated a new resource coordination program.

This program is an arrangement in which federal hydroelectric generation is operationally integrated with thermal generation owned by preference entities. Operational integration of such hydro and thermal generation permits the shaping of surplus energy to maximize its availability and value for the displacement of fossil-fueled generation.

The operational objective of resource coordination is to operate the thermal plants at their most efficient rate of capacity. To the extent that such operation produces more energy than required to meet the load obligations of the thermal plant owners during daily and seasonal low-load periods, the excess energy is used to supply Western's load obligation. This enables Western to back off its hydroelectric generators.

Backing off Western's hydroelectric generators means that the water which would have been used for the generation during the low-load periods remains stored in the reservoirs. This stored water is subsequently used to generate and sell surplus energy during daily and seasonal high-load periods when the energy is most valuable. The benefits of hydro-thermal integration are then shared by Western and the contributors of such surplus energy.

During our first year of operation, we marketed a total of $1.3 billion kilowatt hours of surplus energy which realized $26 million dollars in revenues.

In January 1981 the State of Nevada took a legal position claiming one third of the Hoover power output in the post-1987 period. Subsequently, Western undertook review of this argument to determine if points and authorities cited had been considered in research performed prior to publication of Western's draft of power marketing criteria. We have also received a legal argument from the California Hoover allottees, which was prepared to answer arguments contained in the Nevada position statement and which contained arguments in support of the renewal of their current Boulder Canyon Project power contract. As a means to address all arguments on this issue, we plan to answer formal comments during our formal rulemaking process. As such, Western published the "Proposed General Consolidated Power Marketing Criteria or Regulations for Boulder City Area Projects", in the FEDERAL REGISTER on September 22, 1981. With publication of the proposed criteria in the FEDERAL REGISTER, the formal rulemaking process began. Subsequently, a Public Comment Forum was held on January 21, 1982, at which time formal public comments concerning the proposed criteria were gathered. Based upon the extent and numbers of comments, Western intends to finalize the Consolidated

Power Marketing Plan by mid-1982 and then advance to the power allocation.

## LITIGATION

Some significant legal actions have occurred during the past year. In January of 1981, the Colorado River Energy Distributors Association (CREDA) filed a lawsuit regarding increased rates for the Colorado River Storage Project power. CREDA challengéd the authority of the Assistant Secretary of Energy to set interim rates pending final approval by the Federal Energy Regulatory Commission (FERC). CREDA also argued that the Department of Energy had no authority to make refunds, with interest, or any overpayments if an interim rate was not approved by the FERC. This lawsuit had implications far beyond the Upper Basin of the Colorado River, as the financial integrity of all Reclamation projects from which Western markets power could have been affected. Given the long period of time that the FERC has taken to approve Western's rates in the past, literally millions of dollars in revenues could have been lost, necessitating future rate adjustments that would otherwise have been unneeded.

Western disputed CREDA's allegation that no authority existed in the Assistant Secretary to set interim or "provisional" rates, and the Court agreed with Western. A final judgment against CREDA was filed on May 29, 1981.

I must underscore the fact that the Court's decision does not mean that power customers will remain uncompensated for any overpayment under an interim rate that FERC eventually finds to be too high. Western's customers are entitled to a refund with interest if FERC finds that any of Western's rates are excessive. This balance between the interests of the United States and preference customers protects both the financial integrity of Reclamation projects and the ratepayers, and is, therefore, fair and equitable to both the Government and the public.

Another important legal action centered around a group of landowners in the Stoneville area of South Dakota who formed an association called the Citizens and Landowners Against the Miles City/New Underwood Powerline, and referred to by the acronym CLAMP.

The purpose of CLAMP was to protest the location and construction of the South Dakota portion of the Miles City/New Underwood powerline. The line is being constructed to improve service reliability and prevent outages due to the increasing load demands of the powerline system across Montana, North Dakota, and South Dakota.

The members of CLAMP filed a lawsuit alleging the Government project failed to comply with the National Environmental Policy Act, the National Historic Preservation Act, the Archeological Resource Protection Act, and a number of South Dakota State laws. A trial was held on April 28-30, 1981, in the Federal District Court of South Dakota. The judge, in a memorandum opinion of May 5, 1981, ruled that the Government had complied with all Federal statutes and had prepared an adequate Environmental Impact Statement. The case is presently on appeal before the Eighth Circuit.

Under another action, the United States is attempting, through the court process, to recover from the Sacramento Municipal Utility District (SMUD) a proportionate share of the costs of firming power purchased by the United States for the CVP. SMUD has refused to pay the CVP under the current rates for the costs of purchased power and associated wheeling. SMUD is putting the difference between the current CVP rates and the old rates into escrow. The current balance of that account is over $30 million.

Although the United States District Court ruled in favor of the United States, SMUD appealed the District Court's decision to the Ninth Circuit Court of Appeals. A three-judge panel of the Ninth Circuit reversed the District Court and remanded the case for a trial on whether SMUD's contract allows the United States to recover purchased power and wheeling costs from SMUD. However, the Ninth Circuit went beyond this holding and also held that: (1) the cost of purchased power is not an operation and maintenance expense of the project: and, (2) the Reclamation Project Act of 1939 did not authorize the Secretary to purchase power except during periods of drought. Western is of the opinion that both of these holdings are at odds with earlier court holdings, opinions of Solicitors, and the longstanding practice of the power marketing could be monumental. In addition, that opinion can impact all of

Western's projects and the fuel conservation program. It could impact other power marketing administrations as well. For these reasons, Western is recommending to the Attorney General that a Writ of Certiorari be made to the United States Supreme Court.

Mr. Chairman, this concludes my summary of Western's FY 1983 budget request and accomplishments for 1982.

## REPAYMENT STATUS

Mr. McPhail. Mr. Chairman, you might be interested in how much total investment has been made in the water and power projects in the 15 Western States from which we market power.

That total is $7.1 billion, and of that $7.1 billion investment, $3.7 billion is to be repaid from power revenues; in other words, the allocation for the repayment of power revenues. Since the inception of these water power projects, which date back to the 1902 Reclamation Act, there has been a total $4.3 billion in power revenues from the projects in our area.

The dispersion of those $4.3 billion is $1.5 billion for operation and maintenance of the system, $600 million for purchase power, $900 million for interest on the investment, and $1.3 billion as repayment on the projects.

So, that is a 34-percent repayment already that has been made on the projects in our area.

## REVENUES

Quickly on the revenues, the Western Area Power Administration collected revenues of $384 million in fiscal year 1981.

In 1982 we expect a reduction down to $370 million. That $14 million reduction is caused by the termination of a contract with the Centralia coal-fired plant in the State of Washington.

Now that we no longer have access to the coal-fired generation, that has decreased the amount of power that we have to sell to the Pacific Gas & Electric Co. of San Francisco. So, that is the reason for the decrease in our power revenues. We estimate that our fiscal year 1983 revenues will increase up to about $400 million.

## BUDGET REQUEST

Our budget request this year is for $207.7 million. That is down $3.6 million from last year's request of $211.3 million. This reduction is primarily caused by the reduced amount of power that we have to purchase from that Centralia plant in Washington.

I would like to emphasize, Mr. Chairman, that this budget proposed no new initiatives. All the items in this budget this year are a continuation from last year and years before.

The two largest construction items that we have in the budget, which are continuing from past years, is the western Colorado transmission line that I discussed before this committee last year and the Miles City, Mont., direct current converter station.

### EMERGENCY FUND

There is one change that I would like to note for you, Mr. Chairman. That is the way we handle our emergency fund. We have $500,000 requested for the emergency fund. Two out of the last 3 years we have had emergencies that occurred that cost more than that—floods, tornadoes, and things of that nature that wipe out large sections of transmission lines that cannot be restored for that amount of money.

What we are proposing is to set up the emergency fund similar to the Colorado River storage project and the Fort Peck project, where we have access to the revenues to replenish that fund back up to the $500,000 when it is depleted to replace these emergency items.

### POWER RATE ADJUSTMENTS

I know the committee is interested in the status of our power rates. Just quickly, we have six rate adjustments in process. By rate adjustments, I mean rate increases. They have been carried through the public process and these range all the way from the small Collbran project in Colorado which will increase the Federal revenues by $400,000 per year all the way up to the large Central Valley project in California which will increase the Federal revenues by $84 million a year. That is a substantial increase. The power rates on the Central Valley project in California are going to be raised from about 10 mills per kilowatt-hour to about 30 mills per kilowatt-hour.

That will be the largest power rate we have in our entire system.

### MARKETING PLANS

As our contracts expire, we reallocate the Federal power. We have three of those marketing plans in process right now. We have the Boulder City area projects marketing plan, the Colorado River storage project marketing plan, and the western division of the Pick-Sloan, Missouri River basin marketing plan.

There is one item of concern I would like to note for you, Mr. Chairman, and that is, with the expiration of the Centralia contract to purchase the coal-fired power to firm up our power contracts in California, we are faced with a situation of having to come before this committee for large appropriations in future years, beyond 1985, to purchase power to firm up our contracts.

We are looking at some innovative ways to avoid having to come back and request those moneys, and I mentioned a couple of the options and alternatives in my detailed statement.

That concludes my summary.

### PURCHASED POWER

Chairman HATFIELD. You mentioned purchase power and wheeling reduction of about $7.2 million, I believe, in 1983?

Mr. MCPHAIL. Yes, sir.

Chairman HATFIELD. I am not quite sure I understand the reason for that.

Mr. McPHAIL. We have a contract arrangement with the Pacific Gas & Electric Co. in California. That contract allows us to bank energy with the company and then pull it back when we need it in later years.

Over the years, we banked 8.5 billion kilowatt-hours with the company and we have a right to withdraw that at 2.8 mills per kilowatt-hour. So our proposal for next year is to draw from that bank account, draw out that low-cost power to meet our contract commitments. That is the cause of this reduction.

We are buying our purchase power for 2.8 mills per kilowatt-hour for the next year instead of paying 20 mills per kilowatt hour for the Centralia coal-fired power.

Chairman HATFIELD. Is that a short-term budgetary action, and, if it is, are you sacrificing long-term, high-dollar resource.

Mr. McPHAIL. To some extent, that is correct, Mr. Chairman. If we draw completely from bank account No. 1, this low-cost resource will expire in 1985. So then that forces us to purchase, according to the contract, from our bank account No. 2 power which is priced at the Pacific Gas & Electric Co.'s thermal generation or nuclear generation cost.

So, after about 1985, our purchase power will be at probably 50 or 60 mills per kilowatt-hour. We don't know what the price will be after 1985. In effect, we will be burning oil.

Chairman HATFIELD. Turn to page 9 of your full statement and down in the bottom of the second paragraph it says in that last sentence:

> Thus, we are faced with the major problem of obtaining energy for CVP in the near future with total costs of wheeling, capacity, and energy expected to range from $150 million to $200 million annually.

Tie that into this problem.

Mr. McPHAIL. Once we use up bank account No. 1 after 1985 and we start purchasing out of bank account No. 2 to firm up our contracts, we have to purchase power at Pacific Gas & Electric at their thermal cost.

Chairman HATFIELD. As against the low cost now.

Mr. McPHAIL. That is right.

Chairman HATFIELD. You are drawing down the low-cost account for the short-term, but you have to ultimately purchase the high-cost resource.

Mr. McPHAIL. Yes, sir. We will have to buy power from them at their thermal rate, which is probably oil-fired generation, and that will require this $150 to $200 million annual appropriation for purchased power.

Chairman HATFIELD. Is there no way to get around this? Do you see this as the only option you have, short-term?

Mr. McPHAIL. There are some other options we are exploring as I mention a little later in my statement.

The other option is to have our customers contract to purchase surplus coal-fired energy in other parts of the country and import it into California and then——

Chairman HATFIELD. As an offset in lieu of——

Mr. McPHAIL. That is right, in lieu of purchasing out of bank account No. 2.

Chairman HATFIELD. Could we get some detail on that?

Mr. MCPHAIL. Yes, sir.

Chairman HATFIELD. It just seems to me this may be one of these times where we have to deal with the short-term budgetary benefit, because of the overall budgetary restrictions.

It's clear to me, in the long term we are going to be paying a higher cost and that is going to far offset the advantage we have in the short term.

Mr. MCPHAIL. That is very difficult to evaluate, because we don't know what oil is going to cost in 1986.

[The information follows:]

### CENTRAL VALLEY POWER COSTS

Western is in the process of exploring several options for obtaining firming energy with the goal of purchasing from coal-fired plants in lieu of from oil-fired plants in California. Our concern is in the magnitude of funds which will be required for these purchases. The Central Valley project requires average annual purchases of approximately 3 billion kilowatt-hours to meet contractual delivery commitments. At 50 mills per kilowatt-hour, which is optimistic, an annual purchase power budget of $150 million could be required to meet our contractual commitments.

We are looking at various alternatives to reduce this future purchase power budget.

One such arrangement involves contractual arrangements with one or more Central Valley project customers whereby the customer would purchase energy from a supplier and deliver it to Western for transmission to the Central Valley project and then distribute it to our customers. In return, Western would credit the purchaser's bill for the amount paid for the power delivered to Western. Under this arrangement, Western would maintain the operational responsibility and the obligation to deliver energy to the Central Valley project customers, and the customers would make payment directly to the supplier.

This procedure has been discussed with our customers and the reaction has been favorable. Work is underway on drafting the required documents to enter into such an agreement. Such a program could reduce the project's purchase power appropriations by approximately 50 percent in 1985 and later years.

An additional option is joint purchase arrangements with the Modesto Irrigation District and the city of Redding, Calif., to obtain a long-term supply of power from the Palo Verde nuclear powerplant near Phoenix, Ariz.

Another possibility is to develop a trust fund which would be maintained through advance payments by the power customers. This fund would then be used to purchase firming energy.

### PREPARED QUESTIONS FOR THE RECORD

Chairman HATFIELD. We have some other questions we will submit to you, Mr. McPhail, in writing.

[The questions and answers follow:]

### QUESTIONS SUBMITTED BY CHAIRMAN HATFIELD

### TRANSMISSION SYSTEM IMPROVEMENT PROGRAM

Chairman HATFIELD. I note the 1983 funding request for the transmission system improvement program is $2 million below the current program level. First, how does the $15 million requested in the budget compare to what WAPA projected in the 1982 budget?

Mr. MCPHAIL. Our fiscal year 1982 budget projected a $27.6 million requirement for the program in fiscal year 1983. The present request is substantially below our previous estimate because of a longer requirement for completion of our planning and environmental processes than originally projected.

Chairman HATFIELD. Is the 1983 budget request sufficient to accomplish the planned work without an increase in the backlog of critical items of work?

Mr. MCPHAIL. We believe the 1983 request is sufficient to meet our planned critical work items. This slippage from estimated work projections should be overcome in the next few years without extending the overall program beyond our original plan.

Chairman HATFIELD. What is your funding requirements for this program for the next 5 years and how does it compare to your 1982 projection?

Mr. MCPHAIL. Western's current funding requirement for the next 5 years is approximately $247 million, a $69 million increase from the 1982 projection of $178 million. This change is due to inflation and to internal programing adjustments to bring together similar work items under a common program entity.

## CONSERVATION AND RENEWABLE ENERGY

Chairman HATFIELD. Your statement mentions discussions between Western and utilities for the development of a wind farm project. Briefly, what is the need for this wind farm, including cost and economic feasibility, and the extent of Western's direct involvement?

Mr. MCPHAIL. The wind farm project is one method to help meet Western's purchase power requirements. Two of our customers—the Basin Electric Power Cooperative and the East River Electric Power Cooperative—have indicated that a commercial wind farm coupled with Western's hydropower storage and load-shaping capabilities, could be a viable means of meeting their peaking needs during the mid-1980's. This could be one means for replacing existing oil-fired combustion turbines.

Last year, the Boeing Engineering & Construction Co. informally indicated to Western that they could pursue capital financing and construction of a 10-megawatt wind farm at a cost of about 85 mills per kilowatt-hour. This rate equates to a project capital cost of about $2.2 million per year for a 25-year period. The 85 mills per kilowatt-hour purchase power cost could make a wind farm project an economically feasible alternative to oil-fired peaking generation. Current energy prices for oil-fired peaking generation range about 80 to 100 mills per kilowatt-hour.

## PENDING LITIGATION

Chairman HATFIELD. Could you discuss briefly the Sacramento Municipal Utility District litigation that is pending, particularly the precedents involved and the potential budgetary impact?

Mr. MCPHAIL. The suit between the United States and Sacramento Municipal Utility District centers on whether the contractual rate provisions allow recovery from the district of purchase power and associated transmission costs incurred by the Federal Government in connection with the operation and maintenance of the Central Valley project. The Ninth Circuit Court of Appeals has held, in a decision reversing a summary judgment in favor of the United States granted by the district court, that questions of fact exist as to whether such costs are recov-erable under the language of the contract. The direct effect of an adverse decision at the district court on remand would be a great inequality in the rates charged to the Sacramento Municipal Utility District and those charged other Central Valley project customers.

Western does not believe that the Ninth Circuit's opinion will impact the purchase power portion of the Central Valley project budget. While the opinion raises questions about the extent of the Government's authority to purchase power under Federal reclamation law in 1954 when the contract was executed, there is no question about the authority of Western today to purchase power for the Central Valley project.

## SOUTHWESTERN POWER ADMINISTRATION

### STATEMENT OF RICHARD B. RISK, ADMINISTRATOR

Chairman HATFIELD. I should address you, General Risk.

Mr. RISK. No, sir; not hardly.

Some people call me Dick, and I respond to most anything, Mr. Chairman. [Laughter.]

Chairman HATFIELD. Mr. Risk, this is your first appearance before our committee. We welcome you. You have an excellent statement describing your past experiences and qualifications. This is the first for Mr. Johnson, and Mr. Geisinger.

Mr. RISK. Yes, it is.

Chairman HATFIELD. Each of you gentlemen is here for the first time. It is not as bad as you anticipated, is it?

Mr. RISK. I will tell you in about 20 minutes, Mr. Chairman. [Laughter.]

### PREPARED STATEMENT AND BIOGRAPHICAL SKETCH

Chairman HATFIELD. We will print your full statement in the record and if you will proceed to summarize it, we will get down into the nitty-gritty.

[The statement and biographical sketch follow:]

## STATEMENT OF RICHARD B. RISK, JR.

Mr. Chairman and Members of the Committee, it is a pleasure to make my first appearance before you to present Southwestern Power Administration's (SWPA) proposed budget for fiscal year 1983.

Funds needed to carry out the Southwestern Power Administration's programs during Fiscal Years 1982 and 1983 are:

| | FY 1982 Appropriation | FY 1983 Request |
|---|---|---|
| Operation & Maintenance | $ 8,521,000 | $ 9,070,000 |
| Purchase Power & Wheeling | 9,210,000 | 20,690,000 |
| Construction | 3,538,000 | 4,530,000 |
| Total | $21,269,000 | $34,290,000 |

The requested FY 1983 appropriation represents an increase of $13,021,000 over the appropriation received in FY 1982.

### MISSION

The Southwestern Power Administration (SWPA) carries out the responsibilities assigned to the Secretary of Energy pursuant to Section 5 of the Flood Control Act of 1944, and Section 302 of the Department of Energy Organization Act. These Acts authorize the distribution and sale of power and energy produced at 23 hydroelectric projects constructed and under construction by the Corps of Engineers with a total installed capacity of 2,147,800 kW located in the States of Arkansas, Missouri, Oklahoma, and Texas. Southwestern markets this power and energy in the above four states plus Kansas and Louisiana.

Twenty-one of these 23 projects have been completed and are in operation. Two projects are under construction; with one, Harry S Truman in Missouri, scheduled by the Corps of Engineers to begin commercial operation this spring; and the other, Clarence Cannon, also in Missouri, is expected to be in commercial operation during Fiscal Year 1984.

Southwestern's mission is to market this power and to encourage the most widespread use at the lowest possible rates consistent with sound business principles. This has resulted in the construction of a transmission system of approximately 1,700 miles of high-voltage transmission lines, including 33 substations and switching stations interconnecting the existing hydroelectric generating plants and neighboring utilities. The transmission system provides economic benefits of integrated operations of these multi-purpose reservoir projects, and makes system interconnections with public and private utilities which provide for the delivery of power and energy in wholesale quantities.

The mission also requires that preference in the sale of power and energy shall be given to public bodies and cooperatives at rates sufficient to recover the cost (including amortization) of producing and transmitting the hydroelectric power.

It is estimated in our latest Repayment Study that in FY 1983 gross revenue from the sale of power and energy will be $66,700,000. Cash received and deposited in the U. S. Treasury after net billing will be $61,000,000, more than offsetting the requested appropriation.

## ORGANIZATION

Southwestern is organized into three line Divisions and the support staff associated with the Administrator's Office. The Division of Power Marketing performs the functions of power contracting, rate formulation, hydraulic analysis and the operation and dispatching of the power over the transmission grid. The Power Facilities Division performs the planning, design, construction and maintenance of all transmission facilities. The Administrative Management Division conducts the financial activities and provides support in the areas of ADP services, procurement, land acquisition and inventory management. The Administrator's Office provides all program direction and legal responsibilities.

## BUDGETED PROGRAMS

The request of $9,070,000 for Operation and Maintenance will provide funds to conduct the marketing activity of negotiating and administering power sales contracts; establishment and review of rate levels; dispatching of power to the customers; the maintenance of substations, switching stations, communication facilities and transmission lines; and the direction and support of the organization. This amount represents a $549,000 increase from the prior year.

Of this increase $150,000 is for a planned negotiated pay raise for wage hour employees represented by the International Brotherhood of Electrical Workers; $83,000 for an increase for office and space rental; $156,000 for increases in communications, utilities, supplies and materials, and an increase of $160,000 to perform system line maintenance by contract to meet the escalating maintenance requirements of a system one-third of which exceeds 33 years of age with a normal service life of 35 years. As the remaining transmission system continues to age the maintenance workload is rapidly increasing.

The request for $20,690,000 for Purchase Power and Wheeling is $11,480,000 more than received in FY 1982. This increase at first appears large but in fact resumes normal budgeting criteria from an unusually low figure last year. The criteria used for determining a budgetary level is the amount of thermal energy purchases necessary to cover critical year reservoir inflow conditions for four to six months of the budget year, plus funding for contractual commitments for transmission and energy supply. This amount covers four months of the above conditions. The reduced amount requested in FY 1982 resulted from an unexpected large carryover of funds which occurred after very heavy rainfall conditions in FY 1979 and the first nine months of FY 1980. Unfortunately, the last three months of FY 1980 and the first nine months of FY 1981 set a 52-year drought record and almost all of the carryover was used during this period. This severe drought has continued during the first three and one half months of this year and has caused us to request a reprogramming of unused construction funds into the purchase power account to provide protection for the remainder of this year. During late January we experienced temporary relief through an unusual early rainfall. Because of this, the reservoirs have shown a substantial improvement that provides short term relief to the acute condition we were in. This relief is temporary however and the reprogrammed funds are still expected to be needed before the year is over.

Adequate funding of our thermal energy purchasing needs is very critical considering the vast fluctuations of rainfall which occur in the arid Southwest and the fact that the Emergency Fund is not available for power purchases.

The estimate of $4,530,000 for the Construction program represents an increase of $992,000 from the FY 1982 appropriation. This increase and the entire request represents a collection of many small system modifications necessary to maintain the reliability and the adequacy of the Government's portion of the entire electric utility grid. In addition to the normal requests for System Metering Relay and Communications and Capital Equipment needs, the smaller new projects include $605,000 to redesign the electrical interconnection with the City of Nixa, Missouri, for more reliability; $230,000 to conduct a comprehensive study of the communication requirements of our system, including equipment costs; $300,000 to participate in system interconnections with other members of the Southwestern Power Pool. Our recent studies are indicating some modifications will be necessary during FY 1983 such as, $300,000 for contracting with commercial engineering firms for professional engineering work. This continues our policy to look to the private sector for special expertise and help shave workload peak. Our future construction budgets will be similar to this request in that they will be used to build small projects which will solve area transmission problems.

## PROGRESS REPORT

It is important that this Committee be brought up to date on Southwestern's progress since last year's hearings. Two very good things have occurred in the last 12 months. After many years of difficult relations involving litigation, the electrical power supply dispute between the Associated Electric Power Cooperative, Inc., representing the rural electric customers in the State of Missouri and Southwestern Power have been successfuly resolved. In March 1981 a new contractual arrangement was signed which revised the power supply and delivery arrangments to Associated's satisfaction and improved the financial benefit to the Government of approximately $3,600,000 per year. It also negated the need for the construction of the 110 mile transmission line between the Harry S Truman hydroelectric project and the Southwestern Grid at Carthage, Missouri. This alone saved more than $14,000,000 in Federal funds appropriated for this project. As this Committee knows, $9,000,000 of this appropriation was transferred elsewhere within the Department of Energy by the current year's appropriation bill, and the remaining is part of the current reprogramming request to cover the small purchase power budget. In addition, the contract provides for Associated to lease or purchase designated pieces of Southwestern's 69 kV transmission facilities in Missouri which now are only beneficial to Associated. After one year of operation Southwestern and Associated are both satisfied with the result. The problem of the approximately $28,000,000 escrow account in litigation from 1970 to the date of this contract amendment remains unresolved. However, two weeks ago we had the first negotiation to attempt an appropriate settlement. With the cooperative attitude now established, we believe a resolution is possible. We are also keeping the Justice Department attorneys informed inasmuch as they have been representing us in this longstanding litigation and have jurisdiction in approving any settlement.

The second most significant achievement is even more benefical from a financial standpoint. The Federal Energy Regulatory Commission (FERC) on January 25, 1982, approved Southwestern's rate application filed April 1979. This recent rate action solidifies the additional $16,000,000 per year in increased rates applicable back through April 1979. As this Committee is aware, FERC had disapproved the requested increase in June 1981 as being too low. Our Petition for Reconsideration allowed us to rejustify those rate levels. Our computation procedure combined with the financial improvement to the Associated contract proved sufficient for FERC to approve the requested rates. We have been asked, however, to develop a new rate submission considering recent inflation and submit new rates by September 1982. Southwestern will comply with the FERC order and make every effort to meet that deadline.

We are also very optimistic that the FERC rate order as it is written will moot the litigation challenging the Secretary's rate making authority. We are pleased with the FERC action.

Southwestern also experienced a substantial financial setback last fiscal year. During the first nine months the worst drought in 52 years of record was continued from the previous year. The effect of this drought was to reduced hydro energy for sale and to increase purchase power costs. This combination resulted in Southwestern losing over $17,000,000 on $51,500,000 in sales. This will set our repayment status back. However, the swings in the hydro system are taken into consideration in the rate making process.

Southwestern's contracts have been changing considerably in the recent past. These changes are causing adjustments to the physical transmission system. Last year Southwestern disposed of 29 miles of 69 kV transmission line and two sub and switching stations between the City of Bentonville, Arkansas, and Southwest City in Missouri. These facilities were purchased from the General Services Administration (GSA) by a rural electric cooperative, investor-owned utility and the municipality which had need for these facilities. We also have turned again to GSA to dispose of approximately 260 miles of 69 kV and 138 kV transmission facilities in western Oklahoma. This month GSA will begin negotiations with the Western Farmers Electric Cooperative which is very interested in obtaining these facilities. Also, as stated earlier, GSA will handle the disposal of the 69 kV facilities in the State of Missouri by negotiating with Associated Electric Cooperative.

The disposal actions still provide for a solid and reliable transmission grid and will reduce interest and amortization costs, and hold operation and maintenance expenses level on an increasingly aging system.

## GENERATION DELAY

The two hydroelectric projects under construction by the Corps of Engineers in the State of Missouri have continually faced construction delays. The Harry S Truman Project is now scheduled for the spring of this year and the Clarence Cannon Project will be completed in 1984. These delays have caused considerable problems regarding power supply for our customers in the States of Kansas and Louisiana. We are trying to keep in continual touch with these customers as well as the Corps of Engineers to assure understanding of what is happening. This delay is also impeding the implementation of an additional charge of $.10 per kilowatt of capacity which will increase revenues by $2,400,000 per year. This amount was provided in the April 1979 rate increase to defray the costs allocated to power at the Truman project.

The Ozark and Webber Falls hydroelectric power plants with a total capacity of 184 MW are still unavailable. These plants are unique in that they have inclined shafts, however, all shafts have experienced cracks after about 30,000 hours of operation. Repairs on two of the units are expected to be completed this year and repairs to the others are expected to be completed in 1983 and 1984.

## LITIGATION

In addition to the FERC rate approval and its effect on certain litigation, Orders were filed in two cases to which Southwestern was a party. In the first case the United States filed suit against the Tex-La Electric Cooperative, Inc. (Tex-La) to collect certain delinquent amounts. The case was heard in the Federal District Court for the Eastern District of Louisiana in New Orleans. On September 14, 1981, the judge granted Tex-La's Motion for Summary Judgement. The Judge's Order was based in part on the language of Tex-La's contract with Southwestern and in part on his interpretation of Section 5 of the Flood Control Act of 1944. A companion case involving the same issues was filed by the United States against the Northeast Texas Electric Cooperative, Inc. (NTEC), in the Federal District Court for the Southern District of Texas in Houston. On December 9, 1981, an order was issued granting NTEC's Motion for Summary Judgement, ruling that the decision filed in the Tex-La litigation controlled. The combined net financial loss is $700,000 per year. Both decisions were appealed to the Fifth Circuit Cour of Appeals.

## PRESIDENT'S REORGANIZATION

Last month the President submitted to the Congress a plan to reorganize the Department of Energy. Southwestern Power is proposed for transfer back into the Department of the Interior. We believe that our program will fit effectively into the Interior Department with no adverse impact on our operations.

## SUMMARY

Mr. Chairman, Southwestern's budget request represents the continuation of the present program with no new starts or initiatives. The increase in Operation and Maintenance costs is primarly due to inflation. Our Construction program represents minor projects necessary to assure reliability and maintain our part as an integral member of the Southwest Power Pool. There is a substantial increase in the Purchase of Power and Wheeling activity because FY 1982 was deliberately held low because of prior year carryover funds which are no longer available.

We have had record low inflows during a large part of FY 1981. Such critical periods and other streamflow variations are anticipated in the rate making process. Offsetting good years can also be expected. As FERC has requested, we will submit new rates by year end which will continue to ensure the financial stability of Southwestern Power. We also expect to adjust rates so that net revenues will not be as sensitive to wide variations in streamflow.

Southwestern is a program in good shape. We have and will continue to develop a sound communication program with the preference customers in our area to open up the governmental decisionmaking process to them.

Mr. Chairman, I'm proud to be associated with the Southwestern Power Administration, it's employees and it's customers. I'm pleased to have the opportunity to appear before this Committee and meet the Members.

This concludes my formal testimony.

## BIOGRAPHICAL SKETCH

Richard Risk, Jr., was appointed to the position of Administrator, Southwestern Power Administration, by Secretary of Energy James B. Edwards on October 27, 1981.

Risk, 39, heads the Southwestern Power Administration, which markets Federal hydroelectric power in the States of Missouri, Louisiana, Arkansas, Oklahoma, and parts of Texas and Kansas.

Risk is a 1963 graduate of Oklahoma State University. He served in the U.S. Air Force from 1963 to 1977, then became senior public relations representative for the Getty Refining & Marketing Co. in Tulsa, and was, until this appointment, manager of nuclear information for the Public Service Co. of Oklahoma.

He was later granted an 18-month leave of absence from the Public Service Co. to become executive director of Oklahomans for Energy and Jobs, a nonprofit, pro-energy advocacy citizens group. Risk also initiated a youth education program in the public schools and was State coordinator of American Energy Week in 1981.

## MARKETING PROGRAM

Mr. RISK. Thank you, Mr. Chairman.

Southwestern Power Administration markets the hydroelectric power and energy generated at the Corps of Engineers' reservoirs. Our marketing area includes the six Southwestern States of Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas. The marketing function is performed under authority of section 5 of the Flood Control Act of 1944.

We market power from 23 hydroelectric projects of which 21 are completed and 2 under construction. We have constructed a high-voltage transmission grid of approximately 1,700 miles to obtain economic benefits from the integrated operation of the projects and the diversity of the three main river basins in the area. That would be the Arkansas, Red, and White Rivers.

Our marketing objectives are clearly defined in section 5 and include the following principles: The most widespread use; lowest possible rates; sound business principles; recovery of all costs, including interest and amortization; and, very importantly, giving preference in the sale to public bodies and cooperatives. Our rates are also subject to Federal Energy Regulatory Commission confirmation.

We, like the other Power Marketing Administrations, are a businesslike activity. We are responsible for repaying approximately $700 million invested in generating and transmission facilities and are anticipating approximately $66.7 million in revenues in fiscal year 1983. These revenues far offset the requested $34.3 million in appropriations.

## BUDGET REQUEST

Our appropriation request of $34.3 million represents a $13 million increase over the fiscal year 1982 appropriation. While this increase at first appears large, 90 percent of it, or $11.5 million, represents an adjustment to the purchase power and wheeling account, an amount that was purposely underbudgeted in fiscal year 1982. It was underbudgeted because abundant rainfall in fiscal year 1979 and early fiscal year 1980 had allowed a large unobligated balance to be carried over and available in fiscal year 1982. Our normal budgeting criteria for the purchase power and wheeling activity is based upon 6 months of purchases under critical year inflow conditions. The fiscal year 1983 request represents 4 months of critical year conditions, an amount we believe to be an acceptable risk considering the current budget problem of this country.

The $9.1 million request for the operation and maintenance activity represents a one-half million dollar increase and this 6-percent increase is primarily due to inflation which, I might add, is less than the current national rate.

The $4.5 million request for the construction activity represents an increase of less than $1 million, or 28 percent. This increase and the entire construction request represents no new starts, but rather a collection of many small system modifications necessary to maintain the reliability of the Government's portion of the entire area's electric utility transmission grid.

## ASSOCIATED ELECTRIC COOPERATIVE

Since last year's hearing two very good things have occurred. After many years of difficult relations with the Associated Electric Power Cooperative, we entered into a new contractual relationship last March which revises the power supply arrangements with the preference customers in the State of Missouri. This contract amendment improves the financial benefit to the Government by $3.6 million a year.

## CARTHAGE TRANSMISSION LINE

It also negated the need for the 110-mile transmission line between the Harry S. Truman project and the Carthage, Mo., substation. This alone saved $14 million appropriated for this line. The problem of the $28 million still in litigation from 1970 to 1981 remains unresolved. We are currently working with the Justice Department and Associated on a negotiated settlement of this amount. It will be difficult.

## RATE APPROVALS

The second achievement is even more significant. The Federal Energy Regulatory Commission on January 25 approved our systemwide rate application filed in April 1979. This action solidifies the additional $16.5 million per year back to the filing period which amounts to about $48 million.

We are also very optimistic that the FERC order will also render moot certain litigation challenging the Assistant Secretary's interim ratemaking authority.

Southwestern had two financial setbacks last year. During the first 9 months we experienced the worst drought in 52 years of record. This record-setting drought resulted in Southwestern paying nothing on investment and not being able to cover interest expense of $17 million. Even though these record swings in rainfall are considered in the ratemaking process, they do hurt when they occur.

## LITIGATION

We also lost two court actions. Both of these litigations involved contract language and the Assistant Secretary's ratemaking authority. The district court of New Orleans issued an order on Tex-La Electric Cooperative on September 14 disapproving our application of interim rates to them. In a companion case, Northeast Texas Electric Cooperative was also granted a summary judgment by the district court in Houston. This action was based on the New Orleans decision as precedent. Together, both cases will cost Southwestern $700,000 per year. Both of these decisions have been held in abeyance pending their appeal by the Justice Department on behalf of Southwestern. The recent FERC order, because of its wording, may help in these appeals.

The Federal Energy Regulatory Commission order also requested that Southwestern submit new rate schedules by September 30, 1982. We are presently conducting a repayment study and anticipate that a rate increase will be needed. The customers with whom I have visited are expecting it and are already working with us to develop new rates.

Mr. Chairman, Southwestern's budget request represents minimum funding levels necessary to continue to fulfill our responsibilities for reliable electric service as part of the integrated utility systems of the area. In addition, revenues during the year should nearly double the appropriation request.

I am pleased to represent Southwestern Power and to have the opportunity to appear before this committee.

Thank you very much.

### REVOLVING FUND LEGISLATION

Chairman HATFIELD. Thank you very much, Mr. Risk.

I know that in your budget the largest item is $20.7 million for purchased power and wheeling, which I believe is almost double the current level. Now, my question to you is, are you familiar at all with the revolving fund legislation proposal?

Mr. RISK. Yes, sir; I am.

Chairman HATFIELD. Do you think that legislation or any other possible administrative actions could be taken to reduce the budgetary impact upon these particular fluctuations?

Mr. RISK. Yes, sir; the revolving fund would be one way of reducing the swings in appropriations. We are working with our customers now to find ways to reduce those swings. As you will recall, in fiscal year 1980, I think we applied about $7 million toward repayment, but in 1981 we had a $17 million deficit.

Chairman HATFIELD. What is the status of the legislation?

Dr. OGDEN. The revolving fund bill died, of course. It passed the Senate and got to the House. The House did not act on that legislation before the end of the session. There has been no action in this Congress.

Chairman HATFIELD. Do you think it would be helpful to try to reintroduce that and extend it to all the Power Administrations?

Dr. OGDEN. That was the proposal in 1979. After S. 1440 died in 1980, there was some interest expressed in having a revolving fund bill for WAPA paralleling the one you sponsored and having simple operating funds for the other three because they didn't need the borrowing authority, since they didn't have a large construction program. But the administration has taken no policy position on the matter for or against it. It simply hasn't been addressed so I have no administration position.

Chairman HATFIELD. You can see the flexibility you have in relation to these others.

Dr. OGDEN. It will not only solve Mr. Risk's problem but solve Mr. Geisinger's problem as well. When you get to him, you will see he has a problem of shifting also. As I say, there is no policy position at this point. I am not in a position to say.

## PREPARED QUESTIONS FOR THE RECORD

Chairman HATFIELD. We have some questions for Mr. Risk to answer for the record. I will declare a 5-minute recess to go vote and then I will return to finish up.

[A brief recess was taken.]

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY CHAIRMAN HATFIELD

### PURCHASE POWER AND WHEELING

Chairman HATFIELD. Update the committee on your current water situation.

Mr. RISK. After experiencing record low rainfall conditions during fiscal year 1981, conditions dramatically improved by fiscal year 1982 during the month of January. Our power pools on the system are unseasonally full and we are just entering our spring rainfall season. We can expect favorable reservoir conditions at least to the early summer months.

### OPERATION AND MAINTENANCE

Chairman HATFIELD. Mr. Risk, your statement refers to escalating maintenance requirements associated with a system which, in part, exceeds 33 years of age with a normal service life of 35 years. Yet, of the $550,000 increase over last year's budget, which is less than a 10-percent increase, only $160,000 is for system maintenance work. The remainder of the increase goes for a pay raise, office rental, communications, et cetera.

Would you care to comment on the apparent inconsistency in your statement and the budgetary priority given to maintenance of a transmission system which continues to age at a rapid rate.

Mr. RISK. Of the $550,000 increased, 70 percent is directly related to the solution of maintenance problems. In addition to the $160,000 you mention, the $150,000 pay raise is for the wage hour employees involved in the maintenance program. Finally, almost one-half of the $156,000 for materials, supplies, and communication expenses are for the technical functions of the agency.

The recognition of the need to increase funding for maintenance needs of the aging system was made in last year's budget request. Even though the majority of this year's increase is also dedicated to the facilities' area, it is primarily to keep up with inflation.

## SOUTHEASTERN POWER ADMINISTRATION

### STATEMENT OF HARRY C. GEISINGER, ADMINISTRATOR

### PREPARED STATEMENT AND BIOGRAPHICAL SKETCH

Chairman HATFIELD. The committee will come to order.

Now we will turn to Mr. Harry C. Geisinger, Administrator of the Southeastern Power Administration. We welcome you, sir, to your first hearing. Nice to have you here.

[The statement and biographical sketch follow:]

## STATEMENT OF HARRY C. GEISINGER

Mr. Chairman and Members of the Committee, it is a pleasure to make my first appearance before you to present Southeastern Power Administration's (SEPA) proposed budget for fiscal year 1983.

### FY 1983 BUDGET

An appropriation of $11,848,000 is requested in the President's 1983 Budget to effectively carry out Southeastern's mission in a 10-state area of the Southeast. The Budget Authority requested for FY 1983 is an increase of $4,611,000 over the $7,237,000 appropriated for FY 1982.

A comparison by activities of the FY 1983 Operation and Maintenance budget request with the amounts appropriated in FY 1982 is as follows:

| | FY 1982 | FY 1983 | Difference |
|---|---|---|---|
| System Operation & Maintenance | $1,315,000 | $ 1,500,000 | +$ 185,000 |
| Purchase Power & Wheeling | 5,922,000 | 10,348,000 | + 4,426,000 |
| Total Budget Authority | $7,237,000 | $11,848,000 | +$4,611,000 |

### JUSTIFICATION OF INCREASES

Accomplishment of the program objectives for FY 1983 anticipates continuation of the current employment level of 38 permanent positions, and one other than full-time equivalent.

Overall, the personnel requirements of SEPA have been somewhat reduced during the past 10 years although the amount of power sold, the number of projects in operation, and the number of customers served have increased. The budget proposed for FY 1983 will provide for a continuation of the basic power marketing program at the same personnel level that has prevailed for the last several years. Of the total increase requested, $85,000 is required for increased full year pay and related personnel pay costs, resulting primarily from the October 1981 pay increase and the Executive Pay Increase.

An increase is required for contractual services including an independent audit by a commmercial firm of the financial statements for each power system of the Southeastern Federal Power Program as required by Departmental policy. The results of this examination shall be reported in a letter which attests to the validity of the financial statements. Power repayment studies prepared for the rate adjustments utilize much of the data contained in the financial statements, and this action is necessary to assure that Southeastern can adjust rates as required to keep repayment on a current basis.

An increase of $10,000 is requested to cover increased travel requirements related primarily to power marketing policy implementation, $3,000 for personnel benefits, and an increase of $6,000 is required for nominal increases for supplies, standard level use charges and printing and reproduction.

The major portion of the increase, $4,426,000, is required for Purchase Power and Wheeling. This activity provides for transmission service and for the purchase of firming energy under contractual arrangments with utilities in the Southeast. In the absence of ownership or operation of transmission facilities, Southeastern carries out its marketing program by utilizing the existing transmission systems of the power utilities in the area. This is accomplished through "wheeling" arrangements between Southeastern and each of the area utilities who have transmission lines connected to the projects under which the utility agrees to deliver specified amounts of SEPA power to SEPA customers and SEPA agrees to compensate the utility for the wheeling service performed.

Power not sold to the preference customers was sold to the utilities who perform the wheeling services for Southeastern. A "net billing" process was instituted which provided that the amounts owed the utilities by Southeastern for wheeling were offset by the amounts owed Southeastern by the utilities for purchased power with the remainder being paid by the owing party. Under this arrangement Southeastern needed only minimal appropriations to cover only those amounts where Southeastern would be the owing party after net billing.

While the law specifies that Southeastern give preference in the sale of its power to public bodies and cooperatives, Southeastern has not been able to market all elements of its power to preference customers in the past.

Now, however, due to preference customer load growth and a shift in the power rate structures in the area, preference customers are able to fit all of Southeastern's peaking power into their load curves and use the power both physically and economically. For these reasons, Southeastern's new written power marketing policy for its Georgia-Alabama System and its proposed policy for the Kerr-Philpott System anticipate that in the future all power will be sold to preference customers with no sales to the private utilities who now provide the transmission services. Under these conditions there will be no money owed to Southeastern by the utilities and Southeastern will need to actually pay the companies the total wheeling charge each month. As new sales arrangements are negotiated for the respective utility areas, requests for appropriated funds will need to be further augmented, progressively increasing each year for several years into the future until total implementation of the new contracts is completed.

Funds provided for the purchase of power and wheeling are used only to pay amounts charged the Government under contractual arrangements for (1) delivery of power over non-Federal systems to load centers of preferred agencies for the account of the Government, and (2) purchase by the Government of energy to firm up Federally-generated power to the load factor required by preferred agencies and of support capacity required to meet commitments from the Jim Woodruff Project under adverse water conditions.

It should be noted that the necessary increases in appropriated funds for wheeling will be completely offset by similar increases in power revenues deposited in the Treasury by Southeastern.

Funding at the level anticipated in this request will enable Southeastern to implement its announced power policies on a timely basis.

## OVERVIEW

Southeastern Power Administration, with Headquarters in Elberton, Georgia, markets hydroelectric power from projects constructed and operated by the U. S. Army Corps of Engineers and located in 10 southeastern states. Southeastern has no transmission lines and accomplishes the delivery of power by wheeling agreements with power utilities in the area that have the necessary transmission facilities.

Southeastern presently markets power from 21 multiple-purpose projects to 195 power purchasers. Estimated power revenues for FY 1983 are $65,900,000, reflecting the sale of 2,792 megawatts of installed capacity with 7.05 billion kilowatthours of energy.

Southeastern's overall repayment status is as follows. From inception to September 30, 1981, revenues available for repayment totaled $918,862,268. These revenues were allocated to payment of $317,148,874 of annual operating expenses, $356,413,549 of interest expense, and $245,299,845 of capital investment in electric plant. The total capital plant on September 30, 1981, of $1,002,446,188, less the amount repaid leaves a balance of $757,146,343 to be repaid.

SEPA's projects are grouped for marketing purposes into systems which are financially independent of each other. Presently there are four such systems which will continue into the future, with the Laurel Project operated separately for the short term. The power systems, customer locations and status of wholesale rate adjustments are hereinafter discussed. SEPA has accomplished all of its recent rate adjustments with a minimum of problems.

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## GEORGIA-ALABAMA PROJECTS

The Georgia-Alabama Projects are comprised of the Allatoona, Buford, Carters, Clarks Hill, Walter F. George, Hartwell, Jones Bluff, Millers Ferry, and West Point projects. Two of the four units at Carters are pumping units. Power from the system is sold to customers located in the States of Georgia, Alabama, North and South Carolina, southeastern Mississippi, and panhandle Florida.

Power rates for this system were raised approximately 13 percent on October 1, 1979, approved and placed in effect on an interim basis by the Assistant Secretary for Resource Applications, and long-term approval issued by the Federal Energy Regulatory Commission on April 3, 1981. Rates established to implement the new written power marketing policy for customers in the Duke Power Company area were approved on an interim basis by the Assistant Secretary for Conservation and Renewable Energy on December 18, 1981, and submitted to the Federal Energy Regulatory Commission for long-term approval.

Construction work is over 70 percent complete for the Richard B. Russell Project on the Savannah River. The conventional power units totalling 300,000 KW are scheduled to become operational in 1984 and 1985 with pumping units totaling 300,000 KW added in 1988. Additionally, a conventional unit with an installed capacity of 80,000 KW is being installed at the existing Hartwell Project and is scheduled for operation in 1983.

## CUMBERLAND BASIN PROJECTS

The Cumberland Basin Projects include the Wolf Creek, Center Hill, Dale Hollow, Old Hickory, Cheatham, Barkley, J. Percy Priest, and Cordell Hull projects. The projects are located on the Cumberland River or its tributaries and are all in northern Tennessee and southern Kentucky.

System power is marketed to customers located in Tennessee, Kentucky, Indiana, and Illinois. Power rates which include a 16 percent increase for this system were approved on an interim basis effective retroactively to July 1, 1978. The Federal Energy Regulatory Commission approved these rates on February 27, 1981.

As indicated, it is anticipated that a ninth project, Laurel, now operated as an individual project will be included within the Cumberland system when the new policy is implemented.

## KERR-PHILPOTT PROJECTS

Power from the John H. Kerr and Philpott projects, located in the Roanoke River basin in Virginia, is marketed to customers in Virginia and North Carolina. Power rates were extended and rates were increased for the preference customers served by the Carolina Power and Light Company. On September 14, 1981, the Assistant Secretary for Conservation and Renewable Energy, approved on an interim basis the rate extension and increase effective October 1, 1981, for a period ending September 30, 1982. The rates were forwarded to the Federal Energy Regulatory Commission for final approval.

## JIM WOODRUFF PROJECT

The Jim Woodruff Project is located on the Apalachicola River on the Georgia-Florida state line. All dependable capacity available at the Project is sold to preferred customers in peninsula Florida.

Revised power rates for the Jim Woodruff Project were approved and placed in effect on a temporary basis by the Assistant Secretary for Resource Applications effective October 20, 1979. Final approval of the rates was issued by the Federal Energy Regulatory Commission on April 19, 1981.

## POWER MARKETING POLICY FORMULATION

As previously reported to the Committee, preference agencies' interest in purchasing power from Southeastern has increased substantially during the past few years. It has also been reported that these requests for power for agencies throughout the area come at a time when only one new project, the Richard B. Russell Project, is scheduled to begin operation and only this project, together with the installation of a fifth generating unit at the Hartwell Project, will add Federal power resources during the next 10-year period.

Responding to this increased interest, SEPA adopted a public participation procedure which would allow a review of existing policies and where and when appropriate to issue new written power marketing policies for the agencies' respective systems. Following this procedure, SEPA has published a new written power marketing policy for its 10-project Georgia-Alabama System of Projects and has further negotiated and placed in effect the first major wheeling arrangement under the new policy. This contractual arrangement is with Duke Power Company and 22 preference agencies served from its transmission system. All capacity and energy available to the Duke area is sold to preference customers as anticipated by the policy. Because no power is sold to the Company to effectuate "net billing" SEPA is relying on appropriations authorized to accommodate the new policy arrangements. As other such arrangements are negotiated and placed in effect, increased appropriations will be needed to pay for the wheeling services provided by the contracting utilities. Again, these appropriations would be completely offset by power revenues deposited in the U. S. Treasury by Southeastern.

Southeastern has additionally published its proposed power marketing policies for both the Kerr-Philpott and Cumberland System of Projects. Public forums have been held in both instances and written comments have been solicited and received. These oral and written comments along with the results of numerous consultations are now being evaluated prior to proceeding with the issuance of final policies for the respective systems. With respect to the Cumberland System, this is the first real opportunity to consider the overall area that SEPA might serve. The proposed policy suggests that the area would consist of the TVA area and those utility areas which join the TVA area which SEPA is not serving or considering serving from its other systems. SEPA does not anticipate policy action with respect to its Jim Woodruff Project in the near future. Following finalization of its pending policies SEPA plans to negotiate contracts for future sales which reflect the policy decisions.

## SOUTHEASTERN POWER ADMINISTRATION V. KENTUCKY UTILITIES COMPANY, BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

Because SEPA was unable after five years of negotiations to obtain a reasonable contract with KU for wheeling 25 megawatts of Cumberland River Basin power to eight Kentucky municipalities, the agency filed an application with the Federal Energy Regulatory Commission pursuant to Sections 211 and 212 of the Federal Power Act requesting the Commission to order KU to wheel the power for SEPA on fair and reasonable terms. Several of the municipalities intervened in support of the application. The matter was heard in March and April 1981, with the Presiding Administrative Law Judge later ruling that the Commission lacked authority to order the requested wheeling. Exceptions were taken to the ruling and the matter is now before the full Commission for review.

## GREENWOOD (MISS.) UTILITIES COMMISSION V. EDWARDS AND WRIGHT

The Greenwood, Mississippi, Utilities Commission, located outside the geographically selected marketing area for Georgia-Alabama System power filed Complaint in Federal District Court in April 1977 alleging that SEPA and the Department of Interior violated Section 5 of the Flood Control Act of 1944 and otherwise acted unlawfully in contracting for the sale of powe to other customers while denying Greenwood an allocation of power. Numerous SEPA customers intervened on behalf of the Government. Extensive discovery has been accomplished and several motions have been acted upon. A motion for partial summary judgement filed by the Defendants resulted in a reduction of the number of issues which must be tried. Under the present schedule, discovery must be completed by May 1, 1982, with pretrial briefs and the trial to follow.

## Biographical Sketch

Harry C. Geisinger became the fifth Administrator of the Southeastern Power Administration on November 30, 1981, having been appointed to that post by Secretary of Energy James B. Edwards.

Established in 1950, the Southeastern Power Administration markets Federal hydroelectric power produced at Corps of Engineers' constructed projects in the States of Georgia, Florida, Alabama, Mississippi, North Carolina, South Carolina, Kentucky, Tennessee, West Virginia, and Virginia. Based in Elberton, Ga., Southeastern presently markets power produced at 21 multiple-purpose projects with installed capacity of 2,712,375 kilowatts.

Prior to his appointment, Geisinger owned Geisinger Advertising and Public Relations in Atlanta. He has also served as president of Carbon Fuels, Inc., in Atlanta, and as president of Uniway of East Tennessee, Inc., in Blountville, Tenn.

Geisinger served in the Georgia House of Representatives from 1968 through 1974 and was minority whip from 1970 to 1974.

He received an associate of arts degree at Lincoln College in 1958 and later studied business administration at the University of Cincinnati. He served in the U.S. Navy from 1953 to 1957.

Born in Cincinnati, Ohio, in 1932, he is married to the former Patricia Virginia Capdau of New Orleans. The couple has three children and reside in Dunwoody, Ga., where Mr. Geisinger has been active in community and youth activities.

## BUDGET REQUEST

Mr. GEISINGER. Mr. Chairman, it is a pleasure to come before this committee for the first time and to present Southeastern's budget for fiscal year 1983.

An appropriation of $11,848,000 is requested to effectively carry out Southeastern's mission in a 10-State area of the Southeast.

The budget authority requested for fiscal year 1983 is an increase of $4,611,000 over the $7,237,000 appropriated for fiscal year 1982.

Accomplishment of the program objectives for fiscal year 1983 anticipates continuation of the current employment level of 38 permanent positions and one other than full-time equivalent.

Overall, the personnel requirements of SEPA have been somewhat reduced during the past 10 years, although the amount of power sold, the number of projects in operation, and the number of customers served have increased.

The operations and maintenance budget increase of $185,000 includes the 1982 pay increases, a biannual audit, and other expenses.

## PURCHASED POWER AND WHEELING

The major portion of the increase—that is, $4,426,000—is required for purchased power and wheeling. This activity provides for transmission service and for the purchase of firming energy under contractual arrangements with utilities in the Southeast. Southeastern carries out its marketing program by utilizing the existing transmission systems of the power utilities in the area.

In the past, power not sold to the preference customers was sold to the utilities who perform the wheeling services for Southeastern. A net-billing process was instituted which provided that the amounts owed the utilities by Southeastern for wheeling were offset by the amounts owed Southeastern by the utilities for purchased power with the remainder being paid by the owing party.

Under this arrangement, Southeastern needed only minimal appropriations to cover only those amounts where Southeastern would be the owing party after net billing.

Southeastern had not been able to market all elements of its power to preference customers in the past. Now, however, due to preference-customer load growth and a shift in the power rate structures in the area, preference customers are able to fit all of Southeastern's peaking power into their load curves and use the power both physically and economically.

Southeastern's new written power marketing policy for its Georgia-Alabama system and its proposed policy for the Kerr-Philpott system anticipate that in the future all power will be sold to preference customers with no sales to the private utilities who now provide the transmission services.

Under these conditions, there will be no money owed to Southeastern by the utilities and Southeastern will need to actually pay the companies the total wheeling charge each month.

As new sales arrangements are negotiated for the respective utility areas, requests for appropriated funds will need to be further augmented, progressively increasing each year for several years into the future until total implementation of the new contracts is completed.

It should be noted that the necessary increases in appropriated funds for wheeling will be completely offset by similar increases in power revenues deposited in the Treasury by Southeastern.

Funding at the level anticipated in this request will enable Southeastern to implement its announced power policies on a timely basis.

## REVENUES AND REPAYMENTS

Southeastern presently markets power from 21 multiple-purpose projects to 195 power purchasers. Estimated power revenues for fiscal year 1983 are $65.9 million. Southeastern's overall repayment status is very good. From inception to September 30, 1981, revenues available for repayment totaled $918,862,268.

## POWER MARKETING POLICIES

SEPA has published a new written power marketing policy for its 10-project Georgia-Alabama system of projects and has further negotiated and placed in effect the first major wheeling arrangement under the new policy.

This contractual arrangement is with Duke Power Co. and 22 preference agencies served from its transmission system. All capacity and energy available to the Duke area is sold to preference customers as anticipated by the policy. Because no power is sold to the company to effectuate net billing, SEPA is relying on appropriations authorized to accommodate the new policy arrangements.

As other such arrangements are negotiated and placed in effect, increased appropriations will be needed to pay for the wheeling services provided by the contracting utilities. Again, these appropriations would be completely offset by power revenues deposited in the U.S. Treasury by Southeastern.

Southeastern has additionally published its proposed power marketing policies for both the Kerr-Philpott and Cumberland systems of projects. Public forums have been held in both instances and written comments have been solicited and received.

Oral and written comments, along with the results of numerous consultations, are now being evaluated prior to proceeding with the issuance of final policies for the respective systems.

With respect to the Cumberland system, this is the first real opportunity to consider the overall area that SEPA might serve. The proposed policy suggests that the area would consist of the TVA area and those utility areas which join the TVA area which SEPA is not serving or considering serving from its other systems.

SEPA does not anticipate policy action with respect to its Jim Woodruff project in the near future.

Following finalization of its pending policies, SEPA plans to negotiate contracts for future sales which reflect the policy decisions.

Mr. Chairman, if you have any questions, I will be pleased to answer them. That concludes my remarks.

### PURCHASED POWER AND WHEELING

Chairman HATFIELD. Mr. Geisinger, I would like to go back to that comment you made about future appropriations.

Now, as I understand the new power policy, you will not have net billing arrangements; therefore, no funds will be realized to offset the appropriations amounts, the appropriated moneys. Is that correct?

Mr. GEISINGER. That is correct with respect to the termination of net billing arrangements.

Chairman HATFIELD. You gave a signal about the increased appropriations that would be required. Can you quantify that a little more precisely, in terms of the next several years, what the committee can expect as far as the impact on appropriations.

Mr. GEISINGER. Yes, Mr. Chairman. If our actions stay on schedule, it should increase next year to about $30 million.

Chairman HATFIELD. You sort of dropped your voice about there. I didn't quite hear you.

Mr. GEISINGER. Next year it should increase to about $30 million and will peak out somewhere around $40 million.

Chairman HATFIELD. Peak out?

Mr. GEISINGER. Yes, sir.

Chairman HATFIELD. At $40 million?

Mr. GEISINGER. Mr. Chairman, if I may, I would like to explain. Those dollars are almost instantaneously recaptured. We are billed for the wheeling 20 days after it takes place, that is 20 days after the end of the billing month. In turn, we bill 20 days after the end of the billing month and charge our preference customers for that wheeling. They have 20 days in which to pay. We delay submitting the bill to the Treasury for about 15 days because we know it will take them about 5 days to make payment. So, all in all, the deposits we make to the Treasury versus the amount that we are charged for wheeling often happens within the same week. So it is a washout.

Chairman HATFIELD. You are saying you are recapturing; there is a time lag there involved which causes us certain budgetary problems at the appropriations level.

Mr. GEISINGER. I wouldn't think so. It shouldn't. We are talking about swapping dollars.

Chairman HATFIELD. In effect, then, we are advancing funds—Peter Johnson is repaying on WPPS 1, 2, and 3, what he expects to recapture down the road. You are in a shorter time frame but, in effect, we are doing the same thing here, only now there is a reversal in effect.

Instead of prepaying, there is a time lag here; is that correct?

Mr. GEISINGER. Senator, if I may, Mr. Chairman——

Chairman HATFIELD. I am trying to understand how the billing arrangement works.

Mr. GEISINGER. We are swapping dollars—you appropriate those dollars and they appear on the books, but we are not spending those dollars until we are billed for the wheeling. We are billed for the wheeling charges at the same time we bill our customers for the like amounts. So all we are doing is swapping dollars.

Chairman HATFIELD. But you see, from our point of view—the budgetary and appropriations point of view—those moneys are being scored against us.

Dr. OGDEN. See what happened in the past, they had about $1.5 million to operate the Southeastern Power Administration because all the Administrator needed was expenses for his own staff. What he was doing was selling his unused capacity without energy to the investor-owned utilities and they were selling the Administrator transmission services. They were net billing each other. He was buying their transmission and they were buying his capacity. He was swapping commodities. Now the consumer-owned utilities want that capacity, so the Administrator has to sell that to them and get dollars for it and turn around and pay dollars to the investor-owned utilities for the transmission. The trouble is, since there is no revolving fund, he has to deposit the dollars he collects in the Treasury.

### REVOLVING FUND

Chairman HATFIELD. Here is another reason for a revolving fund. Don't you think the administration should set a policy on that?

Dr. OGDEN. Yes, sir.

Chairman HATFIELD. May I urge you to seek out a policy or friendly instructions from the committee?

Dr. OGDEN. I will accept your friendly instructions.

Chairman HATFIELD. Because this certainly can have a great impact on our whole budgetary process. It distorts our whole scoring procedure. Our scoring procedure may be archaic, but that is what we are doing and it makes it difficult.

Dr. OGDEN. All he is doing is taking it out of one pocket and putting it in the other.

### PREPARED QUESTIONS SUBMITTED FOR THE RECORD

Chairman HATFIELD. That is what Mr. Roosevelt used to tell us about our national debt. So, I don't buy that pocket business.

Thank you very much, Mr. Geisinger. We will provide some questions to be answered for the record.

Mr. GEISINGER. I would be happy to respond.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY CHAIRMAN HATFIELD

### WATER SUPPLY

Chairman HATFIELD. What is the current water supply picture in your service area?

Mr. GEISINGER. As you may know, from June 1980 until December 1981 water conditions in the Georgia-Alabama system were the worst in more than 50 years of record. Water conditions in other SEPA systems were also quite severe. In December the conditions improved and it appears that the drought throughout the area is over. There were significant purchases of power in the first quarter of fiscal year 1982. However, we anticipate that the conditions for the remainder of fiscal year 1982 will be near normal.

Chairman HATFIELD. Can you give the committee an indication of the conditions you expect in fiscal 1983?

Mr. GEISINGER. At this time it is expected that near-average conditions will prevail during fiscal year 1983.

### GREENWOOD, MISS., LITIGATION

Chairman HATFIELD. What is the current status and trial schedule of the Greenwood, Miss., litigation?

Mr. GEISINGER. Under the present court schedule, discovery is to be completed by May 1, 1982, after which pretrial briefs would be submitted and a pretrial conference would be held. A probable trial date would be sometime in the fall of 1982.

## ALASKA POWER ADMINISTRATION

### STATEMENT OF ROBERT J. CROSS, ADMINISTRATOR

Chairman HATFIELD. Now we come to the veteran.

Mr. Cross, you have been here since 1976 as Administrator of the Alaska Power Administration and the veteran. Do you want to proceed and show all these other Administrators how to handle it? I can tell you, I think they handled it beautifully today as if they were all veterans.

Did they tutor from you?

Mr. CROSS. I enjoyed listening to their presentations. They have excellent people who work with them.

#### BUDGET REQUEST

Mr. Chairman, I will be very brief. We are asking $2.8 million in appropriations for 1983. Those funds will be used to continue operation and maintenance and power marketing for the Eklutna and Snettisham hydroelectric projects in Alaska.

Our request is some $700,000 less than the 1982 amounts, reflecting a decision to delete funding in 1983 for our investigations program.

#### PROGRESS REPORT

It is a pleasure to report that we have had another trouble-free year for the projects, good progress on the operation and maintenance programs, and we have had another very good year on sales and revenues.

Our 1981 numbers include sales of 299 million kilowatt-hours and revenues of $3.8 million. We are projecting revenues will exceed $4 million in each of fiscal years 1982 and 1983.

Both projects are meeting repayment requirements under existing law although, as we reported previously, we are deferring some of the Snettisham project's interest under provisions of the 1976 Water Resources Development Act. We are getting very close to the point where that project's power is fully utilized and will be in a position to take action necessary to eliminate those deferrals.

Chairman HATFIELD. Are you going to be able to market all of the power?

Mr. CROSS. We are expecting an 80-percent use in fiscal 1982 and projecting full use of the existing project in 1984.

### CRATER LAKE UNIT

The next point I was going to make is that we have recommended to the Corps that they proceed with the Crater Lake unit of the Snettisham project. We suggested that should come on line in about the 1986–87 time frame. That would increase the energy capability of the Snettisham project by about 60 percent.

### EKLUTNA REPROGRAMING

We also reported last year we had an excessively high bid which caused us to defer installation of new generator windings at Eklutna. The new windings would have increased the rated capacity of that plant by 15 to 20 percent. The plan was a good one, but the costs were too high.

Funds in the amount of $435,000 which we originally programed for the new windings we are now planning to use for other priority maintenance and replacement items which are in my detailed testimony.

### GENERAL INVESTIGTIONS

Then we are starting to reshape investigations because of the decision to terminate funding in 1983. This requires reducing scope and schedules so that the individual studies can be terminated with available fiscal year 1982 funds.

### OPERATIONS AND MAINTENANCE

Just a couple of other notes on the 1983 request. We have got $1,617,000 that constitutes just the normal routine requirements for operation, maintenance, and marketing, $570,000, a one-time cost for replacement of improvement items. The largest replacement item is a bulldozer for the Snettisham project and the largest improvement item is purchase of shunt reactors for the Snettisham transmission line.

Last year we received an appropriation of $50,000 for use in case of emergency problems at the projects. We had no emergencies and the funds remain available. We are not requesting additional funds of that type this year.

The other part of our budget, $622,000, is basically our administrative cost.

By way of summary, the 1983 request provides adequate resources to continue safe, proper operations of those two projects and will insure continuing the integrity of the investors and services to the customers.

[The statement follows:]

## STATEMENT OF ROBERT J. CROSS

Mr. Chairman, I am pleased to present a report on the Alaska Power Administration programs and our budget proposals for FY 1983.

We are requesting $2,809,000 in new budget authority and appropriations in FY 1983. The funds would be used to continue operation, maintenance, and power marketing for the Eklutna and Snettisham hydroelectric projects.

The request is $729,000 less than the FY 1982 amounts, reflecting a decision to delete funding in FY 1983 for APA's investigations program which studies hydroelectric development potential in Alaska. We believe that the State has sufficient financial resources available to conduct such studies as it may find appropriate without further Federal subsidies.

### PROGRAMS

The Alaska Power Administration is responsible for operation, maintenance, and marketing for Federal hydroelectric projects in Alaska.

There are two existing projects: The 30,000 kW Eklutna Project serving the Anchorage and Palmer areas, and the 47,160 kW Snettisham Project, which is the main power source for Juneau. Each project includes a dam, reservoir, powerplant, over 45 miles of transmission lines, plus substations, switchyard, and necessary maintenance facilities. The projects represent about 60 percent of the present installed hydroelectric capacity in Alaska and provide about 9 percent of Statewide utility power requirements.

Power is sold at wholesale to five customer utilities. Actual sales in FY 1981 were 299 million kilowatthours with power revenues of $3.8 million.

Snettisham was authorized and designed as a staged project to meet long-term power requirements of the service area. The existing project is the Long Lake stage (47,160 kW). The future Crater Lake stage would add an additional 27,000 kilowatts.

The investigations work included studies of future water and power programs, analyses of transmission and power market requirements, related work in energy use and renewable resources, and supporting work in use statistics and load forecasts. The work has been coordinated closely with other Federal and State offices and local utility plans.

Emphasis was placed in the investigations program on activities that encouraged and assisted non-Federal water and power development. We are in the process of winding down the investigations program in FY 1982 and are not seeking additional funding in FY 1983.

## PROGRAM ORGANIZATION

Pursuant to the DOE Organization Act, the Secretary's responsibilities with respect to the Alaska Power Administration are carried out by and through the APA Administrator. APA reports to the Assistant Secretary for Conservation and Renewable Energy.

APA headquarters are in Juneau, Alaska, with a field office at each project consisting of operations and maintenance employees. Power marketing and administrative and technical support are provided by the headquarters office. All APA employees are stationed in Alaska.

## AUTHORIZATION

Each project has specific authorizing legislation, including the authorities exercised by APA for operation, maintenance, and power marketing:

- The Eklutna Project Act of July 31, 1950, 64 Stat. 382, as amended.
- Section 204 of the Flood Control Act of 1962 (Crater-Long Lakes Division, Snettisham Project), 76 Stat. 1194, as amended.

The principal authorizations for the investigations work are:

- Section 5 of the 1944 Flood Control Act, 58 Stat. 890, 16 U.S.C. 825s.
- The Act of August 9, 1955, 69 Stat. 618, providing an investigation program in Alaska water and power resources.

## ACCOMPLISHMENTS

I am pleased to report a trouble-free year for our two operating projects, good progress on the O&M programs, and another good year for sales and revenues.

Our FY 1981 energy sales totaled 299 million kilowatt-hours with gross revenues of $3.8 million. These figures are 5 percent above the FY 1980 amounts and set new records for APA.

The Eklutna sales were slightly below the prior year, but still 22 percent above the firm energy target. This reflects a continued favorable water supply and good cooperation from the customers in scheduling surplus power production. We expect to meet or exceed the firm energy target again in FY 1982.

Snettisham sales increased 24 percent in 1981, and we expect a further increase of about 20 percent in FY 1982. This reflects substantial growth in power demands for the Juneau area.

We're projecting revenues in excess of $4 million per year in FY 1982 and Fy 1983.

Both projects continue to meet repayment requirements under existing law, although portions of the Snettisham interest are being deferred under provisions of the 1976 Water Resources Development Act. The interest deferral period ends in FY 1985.

The purpose of the interest deferral was to provide some rate relief during a period when the project power was only partially used. We expect Snettisham sales in FY 1982 will be over 80 percent of the project firm energy capability and that demands will exceed firm energy in FY 1984. Thus we will soon be in a position to take the rate actions necessary to eliminate the interest deferrals.

We reported last year on our recommendation that the Corps of Engineers schedule the Crater Lake Unit of Snettisham Project for completion in the 1986-1987 timeframe. Reviews in August 1981, and again in January 1982, confirm that recommendation. The Corps has resumed its design work on the new unit and is currently exploring the prospects for non-Federal participation in its costs. Crater Lake would add 27 MW and 105 million kWh per year firm energy, an increase of 60 percent over the present capabilities.

Significant items completed or underway in the operation and maintenance program include:

- Completion of the major turbine overhaul on one Eklutna unit in 1981; the second unit will be overhauled this spring.
- Completion of designs for the new office space at Eklutna, with award of the construction contract planned in March, and completion by fall 1982.
- Good progress on the contract for avalanche protection measures on the Snettisham transmission line with completion expected in the summer of 1982.

- Satisfactory progress on all of the normal O&M requirements.

Other activities of interest include completion by the Chugach Electric Association of a new double circuit transmission line replacing 7 miles of Eklutna Project transmission lines. We retain one circuit of the new line, while the second circuit is a part of the Chugach regional power system. This increased use of the APA right-of-way did not involve additional Federal costs.

Also completed is the first stage of the State's Snettisham fish hatchery which is well on its way to becoming a major fish producer. The hatchery is dependent on the high quality, moderate temperature water supply discharged from the power project.

Work is progressing well on the planned Eklutna Project salmon hatchery under sponsorship of the Cook Inlet Aquaculture Association. The hatchery may go to construction later this year.

The next phase of development at Eklutna may involve municipal water supply. Recently completed studies sponsored by Anchorage have recommended detailed investigation of Eklutna as the next major water supply increment. The preferred plan involves pumping water from the Eklutna trailrace, and construction of approximately 30 miles of new water pipelines to connect with municipal water systems.

We consider the hatchery and the municipal water project fully compatible with the power programs. None of these projects involve additional costs to APA.

We reported last year that an excessively high bid forced us to defer installation of new generator windings at Eklutna. The new windings would have increased the rated capacity by 15 to 20 percent. Our intent was to install the new windings at the time the units were disassembled for the major turbine overhaul. The plan was a good one, but the costs were too high.

We've completed a more detailed review of our options and decided to defer further consideration of new windings for at least the next 5 years.

Funds in the amount of $435,000 originally programed for the new windings will be used for other priority maintenance work. Of this, an estimated $177,000 is needed to cover cost increases for the avalanche protection work and $200,000 will be used for purchase and installation of new static exciters for the Eklutna generators. The new exciters will correct a chronic and expensive maintenance problem with present rotating exciters installed as original equipment in 1954.

Significant items accomplished in our investigations program include:

- Completion of power market and transmission analyses as input to the Corps of Engineers General Design Memorandum on the Bradley Lake Project.
- Further investigations of the feasibility of transmission interconnections between the Snettisham Project and other areas of Southeast Alaska.
- Several studies in conservation and renewable resources measures.
- Supporting studies such as power statistics and load forecasts.

All of these activities were carried out in close cooperation with State and local power programs.

We are reshaping the FY 1982 investigations work because of the FY 1983 budget decisions. Basically, this requires reducing scope and direction so that the individual studies can be terminated using available FY 1982 funds.

## FY 1983 REQUEST

Our total FY 1983 request of $2,809,000 includes $2,187,000 for operations, maintenance, and power marketing and $622,000 for "Program Direction" or administrative costs.

The Operation and Maintenance expenses include $1,617,000 for normal, continuing requirements and $570,000 in one-time costs for replacement and improvement items.

The request contemplates maintaining the present staffing levels (26 FTE) for the operations, maintenance, and power marketing functions.

The largest replacement item, $200,000, is for a bulldozer for the Snettisham Project, replacing a 1966 model which is well past its useful life. The equipment is used for road maintenance and snow removal at this remote project, a nearly continuous activity during the winter because of very heavy snowfall at the project site. We get an average of 300 inches, or 25 feet, of snow at the project each winter; the amounts exceed 35 feet in a bad year.

The largest improvement item is purchase and installation of shunt reactors for the Snettisham transmission line at an estimated cost of $271,000. The reactors are needed to improve the operating characteristics of the line-- basically to compensate for the submarine cable portion of the line. Need for the reactors is especially critical because of the increasing loads on the project.

Our 1982 appropriation include $50,000 for use in case of emergency problems at the projects. Those funds remain available, so we are not requesting additional emergency funds this year.

The requested $622,000 for Program Direction is $36,000, or 5.5 percent, below FY 1982 amounts. This covers the full range of administrative management functions--finance, accounting, personnel, etc.--plus overhead costs of our headquarters office.

## REORGANIZATION

The Administration proposes transfer of APA and the other power marketing administrations to the Interior Department as part of the proposal to dismantle the Department of Energy. We would not expect the transfer to affect APA approved programs significantly.

## ASSESSMENT OF OVERALL GOALS

In APA's view, the operation, maintenance, and marketing programs are fully consistent with Congressional intent expressed in their authorization. Both projects have a remaining useful life well in excess of 75 years. The FY 1983 budget request will provide continued progress towards long-term productivity of the investment in these facilities.

Substantial progress has been made toward the long-term goals of wise use and development of hydro and other renewable resources for power. The State of Alaska has undertaken new initiatives to finance and develop power projects thus making further funding of APA investigations work in FY 1983 unnecessary.

In summary, our FY 1983 request provides adequate resources for continued operations, maintenance, and marketing for the two Alaskan hydroelectric projects as well as progress on the major replacement programs. This assures continued integrity of the projects in terms of service to their customers and project revenues to the Treasury.

### GENERAL INVESTIGATIONS

Chairman HATFIELD. Thank you, Mr. Cross.

I note in your 1983 budget request that you do not have any moneys listed for general investigations. Is this because there is some indication maybe the State entities might be interested in taking this over, or what?

Mr. CROSS. We don't have a formal request to take over the investigation program. However, the State power program got a real good start in 1976 and is becoming much more effective. At this point, it is quite a bit larger than ours. As a matter of fact, the deletion of the few Federal dollars for our studies isn't going to be too terrible an impact on the State.

Chairman HATFIELD. This budgetary constraint you are exercising is more of a policy decision?

Mr. CROSS. I guess I don't understand your question.

Chairman HATFIELD. Did you come to this conclusion on the basis of just the general policy that you did not feel the necessity of asking for general investigation funds or was it a matter you felt the requirement to restrict your budget? Did you make a request and have it cut out at OMB?

Mr. CROSS. Actually, we did make a request and OMB did cut it out. It is primarily a budgetary constraint and for understandable reasons.

Chairman HATFIELD. You don't have high priority to fight for it or appeal the decision with OMB?

Mr. CROSS. Our studies have been useful, helpful, and supportive of the State programs. The priority was not high enough.

### HYDROELECTRIC POTENTIAL

Chairman HATFIELD. Do you have a general perspective or estimate on the expansion, potential for hydroelectric production in your marketing area?

Mr. CROSS. Yes; and again the things that are being proposed, with the exception of Crater Lake, are non-Federal development. At this point in time, hydropower provides about 11 percent of the utility power requirements in the State of Alaska. There are several small projects under construction and one major proposal, the Susitna projects, for which the State will probably submit an FERC license at the end of this year.

With those projects now in the construction stage, plus those proposed to be completed by about 1995, we should be over 90 percent hydro in the State of Alaska.

### PREPARED QUESTIONS SUBMITTED FOR THE RECORD

Chairman HATFIELD. We will have some questions for you to answer for the record. Thank you, Mr. Cross, for an excellent presentation.

Mr. CROSS. I will be pleased to respond for the record, sir.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY CHAIRMAN HATFIELD

### GENERAL INVESTIGATIONS

Chairman HATFIELD. I note that the 1983 budget does not include funding for the general investigtions program of Alaska Power. What indications do you have that the State or local entities are interested in assuming this responsibility?

Mr. CROSS. I have discussed this budget decision with State and local representatives. We don't have formal indications that they will take over the studies in the Alaska Power Administration program. However, the State is funding a very substantial power investigations program through the State power authority. We don't expect that deletion of the smaller Federal program will cause any serious disruptions.

### HYDROPOWER EXPANSION

Chairman HATFIELD. What is the potential for expansion of hydroelectric production in your power marketing area?

Mr. CROSS. The potential for expansion of hydroelectric production is large since only a tiny fraction of the hydroelectric resources has been developed. By 1981, hydro projects with installed capacity of 126 mega-watts provided about 11 percent of the statewide utility power requirements. Projects now under construction and in the advanced planning stages could bring the totals to around 1,800 megawatts and 90 percent of the utility energy requirements by the year 2000.

### IMPACT OF POWER PLANNING

Chairman HATFIELD. What would be the impact on power planning for the State of Alaska if these studies were not accomplished?

Mr. CROSS. We don't expect serious impacts on power planning for the State of Alaska, but there will be some delays on individual investigations pending their funding through State or utility programs.

### REPROGRAMING PROPOSAL

Chairman HATFIELD. What is the current status of the reprograming proposal mentioned in your statement?

Mr. CROSS. We have informal clearance on our plans. Since these are minor changes within our O. & M. appropriations, no formal action is needed by the Congress.

### AVALANCHE PROTECTION

Chairman HATFIELD. Explain briefly the avalanche protection work mentioned and why additional funding is needed in 1982.

Mr. CROSS. The avalanche protection work involves relocation of one transmission tower, installation of new, heavy snow "legs" on two towers, and removing a third structure, all on one short segment of the Snettisham line. This work will substantially reduce hazards to avalanche damage. We originally programed $400,000 for this work. Higher-than-expected costs for designs and inflation raised our costs to $577,000, hence the need to divert $177,000 originally earmarked for the generator rewind.

### EKLUTNA REWINDING

Chairman HATFIELD. What is the nature of the problem with the generator at the Eklutna project?

Mr. CROSS. Our plan was to increase rated capacity at Eklutna by 15 to 20 percent with new generator windings, a procedure that has been very successful for other, older powerplants in the Bureau of Reclamation and Corps of Engineers systems. Rewinding generators is normally a very cheap source of extra peaking capacity. Our problem was an excessively high bid for the new windings which we rejected.

Our scheduling was critical also. We wanted to install the new windings at the time we had the unit disassembled for major overhaul. Doing both jobs at the same time saves money and greatly reduces the length of time the units are out of service.

We decided to forego the increase in rated capacity and to proceed with the overhaul work. It would be logical to reconsider the rewind at the next major overhaul, which is probably at least 10 years in the future.

Chairman HATFIELD. What would be the budgetary impact over the next several years if the proposed work is not approved?

Mr. CROSS. Use of the $435,000 rewind money for other, higher priority maintenance programs avoided the need to request the additional funds from the Congress.

### BRADLEY LAKE PROJECT

Chairman HATFIELD. Bring the commimttee up to date on the Bradley Lake project, particularly negotiations with State and local interests to construct the project.

Mr. CROSS. The Corps of Engineers is nearly complete with its general design memorandum for Bradley Lake which is supported by power marketing and transmission studies by Alaska Power Administration.

The State of Alaska is doing its independent review of project feasibility as required by State law for projects they could finance.

The Corps, the State power authority, and the Power Administration have begun work on the agreements covering finances, operation, and marketing which would allow the project to go to construction by the Corps using State funds.

If all the necessary State and Federal approvals are obtained, construction could begin in late fall 1982.

### SNETTISHAM PROJECT

Chairman HATFIELD. Update the committee on the Snettisham project, particularly the need for the additional power and the ability to market that power.

Mr. CROSS. We expect that our fiscal year 1982 sales will be over 80 percent of the present Snettisham firm energy capability and estimate the 1984 demands will exceed the present capability. We have recommended that the Crater Lake unit be scheduled for the 1986 to 1987 time frame, increasing our firm capability by 60 percent. That power would be fully used by 1990 according to our estimates.

### SUMMARY REMARKS

Chairman HATFIELD. I want to commend you for an excellent presentation. I always look forward to this particular panel. They have been consistently quality testimony over the years and today I am especially impressed by our three new Administrators who have not only lived up to, but exceeded the standards of the performance of the past.

Obviously, it speaks well of your staff as well as your own capability. You must be very proud, Dr. Ogden, to be associated with this bunch.

Dr. OGDEN. I am, indeed.

Chairman HATFIELD. I hope you will feel free to contact us at the committee level other than these formal presentation periods, because ongoing problems arise and we may be able to be helpful in anticipating not only with budgetary impact, but many of these things are awfully difficult between budget and policy, and I sit on the policy committee as well, so maybe I can be helpful.

### SUBCOMMITTEE RECESS

We will stand in recess until Friday, March 12, at 10 a.m. We will have the Corps of Engineers' budget.

[Whereupon, at 3:40 p.m. Tuesday, March 2, the subcommittee was recessed to reconvene at 10 a.m. Friday, March 12.]

# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 1983

WEDNESDAY, APRIL 14, 1982

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
*Washington, D.C.*

The committee met at 2:05 p.m. in room 1318, Everett McKinley Dirksen Senate Office Building, Hon. Mark O. Hatfield (chairman) presiding.

Present: Senators Hatfield, Abdnor, Mattingly, Stennis, and Burdick.

## DEPARTMENT OF ENERGY

### OPENING REMARKS

Chairman HATFIELD. The hearing will come to order.

Today, we begin our examination of the fiscal year 1983 budget for the Department of Energy programs within the jurisdiction of the Energy and Water Development Subcommittee.

On behalf of the Appropriations Committee, I want to extend a very special welcome to the Secretary of Energy, Dr. James B. Edwards.

Mr. Secretary, we look forward to your testimony, which will give us an overview of the proposed energy budget, which will then be followed by a panel of distinguished Energy Department officials led by Assistant Secretary Heffelfinger, who will briefly report to the subcommittee on departmental administration and other support activities.

Mr. Secretary, again we are very pleased to have you here today and your full testimony will be placed in the record.

### SECRETARY EDWARDS' FUTURE PLANS

Senator STENNIS. Mr. Chairman, may I add a personal word?

I read in the paper with interest that Dr. Edwards is going to be president of the school of medicine located in his home city, Charleston, S.C., and I know he will be outstanding there.

I certainly wish him well. I hate to see him leave town. I want to maintain his Department here and have him run it a while. Anyway, he is going to do great work down there and I congratulate him.

Secretary EDWARDS. I am not going to leave town tomorrow, by the way.

Chairman HATFIELD. Mr. Secretary, that was the first question I had on my list. [Laughter.]

Now that the issue has been raised, may I proceed to question you a little bit on that issue before you get to your testimony.

Secretary EDWARDS. Senator, I will try to respond to any questions you have.

Chairman HATFIELD. Have you incorporated some remarks on that subject in your official testimony? [Laughter.]

Secretary EDWARDS. Senator, I had not planned to talk to that point at all, but I will be glad to respond.

Chairman HATFIELD. I think we can revolve this committee into a career discussion session for a moment. [Laughter.]

Are recent news reports accurate that indicate you have been offered an appointment? I assume you have discussed this with President Reagan?

Secretary EDWARDS. Mr. Chairman——

Chairman HATFIELD. Do you have a deadline to meet by the board of trustees?

Secretary EDWARDS. No; we are very fortunate. The board of trustees has, in fact, made the offer to me to become president of the Medical University of South Carolina at Charleston, my home town, and that may be one of the reasons I have had a smile on my face recently. But they, fortunately, have given me no deadlines to meet so I can respond to that at any time I think it is appropriate.

I have talked to the President on two occasions about the possibility of my leaving. I hope we can fulfill some remaining obligations and then leave at an appropriate time. We have not decided when that time will be, Senator.

Chairman HATFIELD. The President has not given you a deadline to totally dismantle the Department before you leave? [Laughter.]

Secretary EDWARDS. Senator, we would like very much to complete this merger, as we refer to it now, into the Department of Commerce before I leave town, so maybe you can help me hurry that along so I can get on my way.

Chairman HATFIELD. I want to commend you and congratulate you, whatever your future may be. I am the holder of an honorary degree from the University of South Carolina. I feel it would be a great career opportunity for you, if that is your desire and your wish to go in that direction.

Secretary EDWARDS. I also have an honorary degree from South Carolina, so you and I are alumni.

Chairman HATFIELD. Please proceed with your testimony.

## STATEMENT OF HONORABLE JAMES B. EDWARDS, SECRETARY

### STATEMENT HIGHLIGHTED

Secretary EDWARDS. Mr. Chairman, members of the committee, I appreciate the opportunity to discuss with you the fiscal year 1983 budget for Federal energy programs. I have submitted a statement for the record and would like to make a few comments.

This budget is structured to carry out this administration's policy of relying on the free market for solutions to energy problems. The free market has served us well in the past and will work well in the future when it is allowed.

Our fiscal year 1983 budget request follows the pattern begun in last year's request, to redirect our efforts in favor of the more appropriate Federal role of longer term, high-risk technology research and development with a potentially high payoff. This redirection in spending and the removal of over 200 sections of petroleum price and allocation regulations, along with retaining, without change, only 74 of the 155 other existing and proposed regulations we inherited in January 1981, are the keys of our policy of placing more reliance on the private sector and the market.

This policy is working well. Since the decontrol last year, drilling and seismic work has reached all-time peaks and oil imports are at the lowest since 1975.

## FEDERAL ENERGY ROLE

The fiscal year 1983 budget request supports the five basic responsibilities in energy which are unique to the Federal Government:

One, is establishing sound policies which give individuals and business incentive to produce and use energy efficiently and allow an integrated energy market to function.

Two, protecting against energy supply disruptions, primarily through maintenance of the Strategic Petroleum Reserve.

Three, providing support to long-term, high-risk, potentially high-payoff research.

Four, supporting production and testing of nuclear weapons.

And last, performing other tasks, such as operation of naval petroleum and oil shale reserves and marketing Federal power and utility regulation as required by law.

## ENERGY PROGRAMS REORGANIZATION

As was stated in the national energy policy plan, energy is no longer viewed as an isolated entity, but an integral part of the overall economy. Consequently, a separate Energy Department is no longer necessary. The five basic energy responsibilities can be carried out more efficiently and effectively in other Cabinet-level departments with related responsibilities.

In the proposed reorganization plan, these responsibilities will be divided principally between the Department of Interior and the Department of Commerce.

The Departments of Justice and Agriculture will also assume some functions and the Federal Energy Regulatory Commission will become a separate independent regulatory agency.

A new agency, the Energy Research and Technology Administration will be established within the Department of Commerce to manage energy research and development, uranium enrichment, general science, and defense activities.

Other energy functions, such as energy information collection and analysis, emergency preparedness, international energy activities, conservation grant management, and national energy policy formulation will also be assigned to Commerce, but they will not be part of ERTA. The Department of the Interior will manage the Naval Petroleum and Oil Shale Reserves and the five Power Marketing Administrations.

## FISCAL YEAR 1983 BUDGET

The fiscal year 1983 budget request for Federal energy programs is $12.1 billion in budget authority, including $2.1 billion in off-budget oil acquisition funds for the Strategic Petroleum Reserve. The President has recently transmitted a budget amendment increasing the original request by $311 million to provide sufficient funds to support the requirements of the recently signed nuclear weapons stockpile memorandum.

Funding is reduced in energy research and development, the strategic petroleum reserve, and program administration. Other major activities have increased funding requirements, including atomic energy defense activities, general science, and the Power Marketing Administrations.

R. & D. activities represent 27 percent of the fiscal year 1983 budget and show a 14-percent reduction from fiscal year 1982. This reduction is a continuation of the redirection of fossil, conservation, solar, and renewable resource programs.

Magnetic fusion is a good example of long-term research effort with potentially high payoff. The fiscal year 1983 budget request of $444.1 million will provide for continuation of our scientifically oriented fusion program with limited engineering effort.

## NUCLEAR FISSION PROGRAM

The nuclear fission program provides the research base for the continued development of nuclear power as an economic and environmentally acceptable source of electric power. The fiscal year 1983 budget request is $1,016,000,000.

In mid-fiscal-year 1982, in support of the President's economic recovery program, we will begin to streamline certain aspects of the liquid metal fast breeder reactor program. This is necessary so that the resources, facilities, and technical expertise can be used in the most cost-effective manner. The breeder base program will continue to support technology development on fuels, materials, and structures.

The principal plant project included in the liquid metal fast breeder reactor program is the Clinch River breeder reactor. In fiscal year 1983, it is anticipated that site preparation activities will move forward, as well as the required licensing support, design work, and equipment procurement and fabrication activities.

Emphasis is also placed on closing the nuclear fuel cycle, principally by continuing research on commercial reprocessing of spent fuel and on nuclear waste disposal.

The administration is committed to the development of commercially financed, high-level waste repositories. To finance repository activities, we support creation of a nuclear waste disposal fund. Fees will be paid into the fund by utilities which use nuclear power to generate electricity.

In fiscal year 1983, borrowing authority of $185 million is requested to provide program continuity early in the year until fees are collected from the utilities later in the year. Approval of this borrowing authority by the Congress is of vital importance for a smooth transition to utility financing of the nuclear waste geological repository program.

Enabling legislation for collecting fees for the nuclear waste disposal fund from the utilities is also vitally needed. I urge you, Mr. Chairman, and the committee, to take action in an expeditious manner on this issue.

The purpose of the basic energy science program is to provide knowledge that is relevant to energy production, conversion, exploration, and use.

In fiscal year 1983, the budget request of $283 million will enable the program to maintain most of the ongoing core research program and will permit some growth in biological energy research, advanced energy projects, engineering, mathematics, and geosciences.

The fossil energy budget funds will be applied to more generic research efforts and technology-based development related to production of coal, oil shale, natural gas, and petroleum.

## CONSERVATION PROGRAMS

The fiscal year 1983 request of $17.5 million for conservation programs will support research and development in the multisector energy conversion and utilization technology program.

State and local assistance programs, including grants for weatherization, schools, and hospitals, are proposed to be terminated together with support for appropriate technology and energy-related inventions. Funds for weatherization are available through the low-income home energy assistance program administered by the Department of Health and Human Services and through the community development block grant program administered by the Department of Housing and Urban Development.

## SOLAR AND OTHER RENEWABLES

The fiscal year 1983 funding request for solar and other renewable energy programs totals $83 million. The administration's policies for solar energy continue the redirection begun last year to place greater emphasis on the private sector in the development and commercialization of solar technologies.

No new fiscal year 1983 budget authority is being requested for active heating and cooling, passive heating and cooling, ocean thermal energy systems, hydropower, and solar information programs.

Basic research will continue in photovoltaics, solar thermal, biomass, and wind energy program areas and we will complete our commitment for research and development.

The programs included in the general science appropriation support basic research to expand our knowledge of the fundamental structure and behavior of matter. The budget request for fiscal year 1983 is $601 million, up from $543 million in fiscal year 1982.

## NUCLEAR WEAPONS ACTIVITIES

Our defense activities support the national security mission of the Department of Defense through the development, testing, and production of nuclear weapons and materials. The increase in funding from $4.7 billion in fiscal year 1982 to $5.8 billion in fiscal year 1983 is principally related to increased production requirements of weapons systems outlined in the Nuclear Weapons Stockpile Memorandum recently signed by the President. We have also transmitted a fiscal year 1982 supplemental of $97 million in response to the revisions in the Nuclear Weapons Stockpile Memorandum.

The defense waste management program also shows a substantial increase, from $365 million in fiscal year 1982 to $518 million in fiscal year 1983, with the largest increase in terminal storage to improve our current and future storage capacity.

## STRATEGIC PETROLEUM RESERVE

Our Strategic Petroleum Reserve funding request for fiscal year 1983 is $2.3 billion, $2.1 billion of which is off-budget for oil acquisition and transportation. The total available capacity of the reserve will be filled by the end of fiscal year 1983 to a cumulative capacity of 343.1 million barrels. New authority of $222.5 million is requested in fiscal year 1983 for facilities development.

The fiscal year 1983 FERC budget request is $92.5 million, to be partially offset by approximately $60 million from fees and other charges, assuming favorable consideration of the FERC user fee legislation by the Congress.

Under the reorganization plan, regulation activities, other than FERC, will be assigned to the Department of Justice. The Department of Justice will carry out the remainder of the adjudicatory activities and obtain redress for violations which occurred during the period when price and allocation controls were in effect on crude oil, residual oil, and refined petroleum products.

The budget request for the Department of Justice's energy regulatory activities is $18 million, which will be adequate to support a vigorous enforcement effort and allow these cases to be prosecuted fully.

The fiscal year 1983 budget request for departmental administration reflects reduced requirements and results from a decline in the number of Federal employees and the reduction of overhead anticipated with the elimination of the Department of Energy as a Cabinet-level organization.

Mr. Chairman, I believe the fiscal year 1983 budget request for Federal energy programs will permit us to carry out those essential energy tasks which are unique to the Federal Government, while leaving the remaining energy responsibilities to the genius of the American people.

Mr. Chairman, that concludes my testimony and I will be glad to respond to any questions you may have.

[The statement follows:]

## STATEMENT OF JAMES B. EDWARDS, SECRETARY, DEPARTMENT OF ENERGY

Mr. Chairman, Members of the Committee, I appreciate the opportunity to discuss with you the Fiscal Year 1983 budget for Federal Energy programs.

This budget is structured to accord with the proposed reorganization of energy functions currently administered by the Department of Energy. The objective of this budget and reorganization is to continue the transition from an energy policy which has led to a costly, ever-expanding energy bureaucracy, to a policy which relies on the free market for solutions to many of our energy problems. We believe the free market has served us well in the past and will work in the future when it is allowed the freedom to do so.

Last year, our budget request focused on redirecting Federal support away from demonstration and commercialization activities that are better handled by the private sector in favor of the more traditional and appropriate Federal role of funding longer-term, high-risk technology research and development with a potentially high payoff. That trend is continued and further refined in the FY 1983 budget request. This realignment of budget priorities was accompanied by a major step toward freeing the marketplace with the President's action of January, 1981, removing all price and allocation controls from crude oil and petroleum products.

Our redirection in spending and the removal of over 200 burdensome, counterproductive regulations are the keys to this Administration's policy of placing more reliance on the private sector and the market to stimulate energy conservation, production, and the selection of new technologies for commercialization.

This policy is working well. Since the decontrol of oil last year, drilling and seismic work have reached all time peaks, and this year we expect to break those records. Oil imports are at the lowest level since 1975, a vibrant sign that conservation is working.

The FY 1983 budget request for energy programs has been developed to support the five basic responsibilities in energy which are unique to the Federal government:

- Establishing sound public policies which give individuals and business the incentive to produce and use energy efficiently and allow an integrated energy market to function;
- Protecting against energy supply disruptions, primarily through maintenance of the Strategic Petroleum Reserve;
- Providing support to long-term, high-risk, potentially high-payoff research;
- Supporting national defense needs through civilian control of research, development, production, and testing of nuclear weapons; and

- Performing other tasks, such as operation of Federal energy resource reserves and Federal Power Marketing Administrations, and utility regulation required by law.

There being no further role for the government in the petroleum marketplace and in the commercialization of energy technologies, it is no longer necessary to have a single-purpose Cabinet-level department for the management of energy matters. As was stated in the National Energy Policy Plan released in July, 1981, energy is no longer viewed as an isolated entity, but rather as an integral part of the overall economy. Consequently, the management of these five basic energy responsibilities can be carried out more efficiently and effectively in other Cabinet-level departments which are charged with major responsibilities in the management of the Nation's economy.

In the proposed reorganization plan, these responsibilities will be divided principally between the Department of Commerce and the Department of the Interior. Completion of petroleum regulatory enforcement and related activities will go to the Department of Justice, and the Federal Energy Regulatory Commission will become a separate, independent regulatory agency. The Department of Commerce will receive the bulk of the energy programs currently managed by the Department of Energy. A new agency, the Energy Research and Technology Administration (ERTA), will be established within the Department of Commerce to manage energy research and development, uranium enrichment, general science and defense activities. I am convinced that our security can be enhanced, our trade promoted, and our energy technologies advanced by combining these energy programs with the existing trade enhancement and technology development activities in the Department of Commerce.

The creation of ERTA will allow specialized management of the high technology energy, science, and weapons programs than was possible in the Department of Energy. This streamlined new organization will be able to focus necessary management attention on the difficult and unique set of problems that face high technology program development, and efficiency gains will result from the interrelationships of these programs.

Independent of ERTA, the Department of Commerce will also administer other energy functions, such as energy information collection and analysis, emergency preparedness activities, international energy activities, conservation grant management, and national energy policy. The Department of Commerce is particularly well suited to manage these programs because of its current information collection and statistical functions, its existing relationships with the business community and with State and local governments, and its national and international economic policy functions.

The Department of the Interior will manage Federally owned energy resources including the Strategic Petroleum Reserve, the Naval Petroleum and Oil Shale Reserves, and the five Power Marketing Administrations. The Department of the Interior's expertise in natural resource management makes it the logical recipient of these programs. In addition, certain mining research and development and related activities will transfer to the Department of the Interior's Bureau of the Mines.

## BUDGET SUMMARY

The FY 1983 budget request for Federal energy programs is $12.1 billion in budget authority, including $2.1 billion in off-budget oil acquisition funds for the Strategic Petroleum Reserve. The anticipated outlays are $12.5 billion. This is a decrease of $1 billion in budget authority from FY 1982. Areas where requested funding is reduced include Energy Research and Development, the Strategic Petroleum Reserve, and Program Administration. Other major activities have increased funding requirements, including Atomic Energy Defense Activities, General Science, and the Power Marketing Administrations.

I would like now to discuss the funding request for selected major program elements.

## RESEARCH AND DEVELOPMENT PROGRAMS

As mentioned above, the proposed reorganization plan transfers research and development programs to the Energy Research and Technology Administration (ERTA).

These activities, which represent 27 percent of the overall budget in FY 1983, show a 14 percent reduction from FY 1982. This reduction is a continuation of the redirection begun last year of the fossil, conservation, solar and renewable resource programs away from expensive technology demonstrations in favor of long-term, high-risk, potentially high-payoff research and development.

I will discuss certain of these technologies in greater detail.

## MAGNETIC FUSION

Our efforts in fusion energy are directed toward systematic development that would provide us with a potentially inexhaustible energy resource base. The FY 1983 budget request of $444.1 million will provide for continuation of our scientifically oriented fusion program with a limited engineering effort. The plasma confinement effort will be aimed at pursuing mainline tokamak and mirror concepts. The Tandem Mirror Experiment Upgrade at Lawrence Livermore Laboratory will be operating and construction of the Tokamak Fusion Test Reactor project at the Princeton Plasma Physics Laboratory will be completed.

Funds are also proposed to fabricate an Advanced Toroidal Facility at Oak Ridge National Laboratory and improve the capability of the existing Doublet III machine to provide the research tools necessary to address the physics issues in present and advanced toroidal concepts. Funding is also proposed to continue construction activities on the Mirror Fusion Test Facility-B at Livermore.

## NUCLEAR FISSION

The Nuclear Fission program provides the research base for the continued development of nuclear power as an economic and environmentally acceptable source of electric power. The FY 1983 budget request is $1,016 million.

The FY 1983 budget request for the Breeder Reactor Systems program is $577.5 million. In mid-FY 1982, in support of the President's Economic Recovery Program, we will begin to streamline certain aspects of the Liquid Metal Fast Breeder Reactor (LMFBR) program. This is necessary so that the resources, facilities, and technical expertise can be used in the most cost effective manner. The breeder base program will continue to support technology development on fuels, materials, and structures.

The principal plant project included in the LMFBR program is the Clinch River Breeder Reactor (CRBR). In FY 1983, it is anticipated that site preparation activities will move forward as well as the required licensing support, design work, and equipment procurement and fabrication activities.

Emphasis is also placed on closing the nuclear fuel cycle, principally by continuing research on commercial reprocessing of spent fuel, and on nuclear waste disposal. The Administration is committed to the development of commercial high-level waste repositories. To finance repository activities, we propose that a Nuclear Waste Disposal Fund be created into which fees will be paid by utilities which use nuclear power to generate electricity. In FY 1983, borrowing authority of $185 million is requested to provide program continuity early in the year, until fees are collected from the utilities later in the year. It is estimated that $300 million in fees will be deposited in the fund in FY 1983.

## BASIC ENERGY SCIENCES

The purpose of the Basic Energy Sciences (BES) program is to provide knowledge that is relevant to energy production, conversion, exploration and use.

In FY 1983, the budget request of $283 million will enable the program to maintain most of the ongoing core research program and will permit some growth in biological energy research, advanced energy projects, engineering, mathematics, and geosciences. In addition, the BES program will continue to operate a network of research facilities at the National Laboratories as a national trust.

In FY 1983, the BES program will support research using major facilities such as the National Synchrotron Light Source at Brookhaven National Lab, and the Combustion Research Facility at Sandia Laboratories. Funding is also provided for modifications of the Weapons Neutron Research Facility at the Los Alamos Scientific Laboratory, which will be the first in a new generation of neutron sources for civilian research. In FY 1983, this program will assume the responsibility for operation of the Stanford Synchrotron Radiation Laboratory, formerly funded by the National Science Foundation.

## FOSSIL ENERGY

This Nation still has abundant domestic resources of coal, oil shale, natural gas and petroleum. As a result of the Administration's action last year to decontrol the price of oil, government subsidies and regulations which reduced production and encouraged oil imports have been abandoned, and free market forces have greatly increased the attractiveness of domestic energy investments.

The Fossil Energy budget request reflects this changing role of the Federal government. The process began last year, when the Fossil Energy budget was realigned to concentrate on long-term, high-risk research and development, while relying on the private sector to demonstrate and commercialize promising individual technologies and processes. In FY 1983, funds will be applied to more generic research efforts and technology base development.

The budget request for these activities is $107 million. Of this figure, $91 million is for the Coal program. Almost 50 percent of the budget request for Coal is devoted to the Advanced Research and Technology Development and Coal Liquefaction programs, with lesser amounts earmarked for work in the areas of coal gasification, fuel cells, environmental control technology and coal preparation, direct combustion, and mining research and development.

In the Petroleum program, the FY 1983 effort will concentrate on enhanced recovery of light and heavy oil, and chemistry and physics work and environmental mitigation efforts in oil shale. In addition, the advanced exploratory research activities, which provide generic and fundamental support to all petroleum programs, will continue. The budget for petroleum activities is $16 million.

## CONSERVATION

Efficient energy use is in everyone's economic interest. Rapid increases in energy costs have fostered substantial conservation efforts by individuals, businesses and other institutions in the past few years. The President's action to immediately deregulate crude oil and petroleum product prices in January 1981 has done much to free the market and accelerate this process. Consequently, a major Federal conservation program is no longer necessary.

Conservation Research activities will concentrate on fundamental research designed to build a technology base that can provide the foundation for future development of commercial products by the private sector.

In FY 1983, research and development funding of $17.5 million will be concentrated in the Multi-Sector Energy Conversion and Utilization Technology program area. The results of research performed there will be made available directly to the private sector, rather than being utilized by government technology applications programs serving specific end-use sectors, as was the case previously. The market forces which are behind the impressive nationwide conservation efforts render these intermediate technology application activities unnecessary beyond FY 1982.

The State and local assistance programs, which include grants for Weatherization and Schools and Hospitals, are proposed to be terminated, together with support for appropriate technology and energy-related inventions. The budget request of $4.3 million will fund the personnel required for monitoring and termination of activities relating to final grants awarded in the previous year. This activity will be housed in the Department of Commerce, but not within ERTA. The FY 1983 Budget would still provide Federal funds to the States for weatherization through the Low-Income Home Energy Assistance Program administered by the Department of Health and Human Services and through the Community Development Block Grant Program administered by the Department of Housing and Urban Development. Continued Federal support for the appropriate technology and energy-related inventions programs can no longer be justified in an economic climate so conducive to private support for energy conservation.

## SOLAR AND OTHER RENEWABLE ENERGY

Solar and Other Renewable Energy resources offer the potential for significant contributions toward achieving energy self-sufficiency over the long term. The FY 1983 funding request for these programs totals $83 million.

The Administration's policies for solar energy continue the redirection begun last year to place greater emphasis on the private sector in the development and commercialization of solar technologies. The free market will determine the development and introduction rates of solar technologies consistent with their economic potential. A number of new technologies have been developed in recent years, and it is time that they be tested in the marketplace.

Consistent with this policy, no new FY 1983 budget authority is being requested for Active Heating and Cooling, Passive Heating and Cooling, Ocean Thermal Energy Systems, Hydropower, and Solar Information programs.

The Photovoltaics program budget request of $27 million is directed toward advancing the technology base upon which private industry can develop photovoltaic energy systems. Basic research activities will continue in the Solar Thermal, Biomass, and Wind Energy program areas, and the request of $9.5 million for Solar International activities will complete our Government's commitment to the Saudi Arabian Government under the Cooperative Project Agreement for jointly funded solar energy research and development.

The overall strategy of the Geothermal program is to conduct generic and technology base research. Consistent with this strategy, the $10 million FY 1983 geothermal program is structured around three areas: orderly termination of the hot dry rock program, completion of government involvement in the geopressurized resource definition program, and performance of research and development in the areas of geochemistry, geoscience, and energy conversion with particular application to lower-temperature resources.

## GENERAL SCIENCE

The programs included in the General Science appropriation support basic research to expand our knowledge of the fundamental structure and behavior of matter. The budget request for FY 1983 is $601 million, up from $543 million in FY 1982.

The High Energy Physics Program shows the largest increase. The FY 1983 budget request of $429 million is almost 18 percent above the previous year's funding. One of the major activities in FY 1983 will be the commissioning and initial operations for research of the Energy Saver Superconducting Synchrotron at Fermi National Accelerator Laboratory. Priority is also given to operation of the Positron Electron Project Colliding Beam Facility at the Stanford Linear Accelerator Center. There will be a significant accelerator R&D program at Brookhaven National Laboratory on superconducting magnets, which are a high priority need for the future of the U.S. High Energy Physics Program.

## DEFENSE ACTIVITIES

Defense Activities support the national security mission of the Department of Defense through the development, testing, and production of nuclear weapons and materials. The increase in funding from $4,692 million in FY 1982 to $5,817 million in FY 1983 is principally related to increased production requirements of weapons systems outlined in the recently signed President's Nuclear Weapons Stockpile Memorandum. We have also proposed a FY 1982 supplemental of $97 million in response to the revisions in the NWSM.

Funding for full scale production of eight types of weapons will be requested, and weapon research and development efforts will also increase. Materials Production funding shows an increase commensurate with production requirements and the continuation of capital improvement projects.

The Defense Waste Management program also shows a substantial increase, from $365 million in FY 1982 to $518 million in FY 1983, with the largest increase in Terminal Storage to improve our current and future storage capacity. The Waste Isolation Pilot Plant project and the Defense Waste Processing facility - a glassification project - will be continued in FY 1983.

## STRATEGIC PETROLEUM RESERVE

The total funding request for FY 1983 is $2,316 million, $2,074 million of which is off-budget for oil acquisition and transportation. As a result of limitations on available permanent storage capacity and, further, as a result of revised oil price assumptions, this funding level is well below FY 1982's $3,875 million, which included $3,684 million off-budget for oil acquisition and transportation. The total available capacity of the Reserve will be filled by the end of FY 1983 to a cumulative capacity of 343.1 million barrels.

New authority of $222.5 million is requested in FY 1983 for facilities development. As a result of accelerated leaching of the Bryan Mound caverns and other factors, storage capacity in the near term is being developed faster than previously anticipated. However, deferral of $53 million in FY 1982 funds is being proposed as part of a one year stretch-out of the completion of the 750 million barrel system. This will have no effect on available storage capacity prior to 1987.

## ENERGY REGULATION

Energy regulatory activities include the work of the Federal Energy Regulatory Commission (FERC), which becomes a separate, independent agency under the proposed reorganization plan, and the duties currently being performed by the Economic Regulatory Administration (ERA) and the Office of Hearings and Appeals (OHA).

In FY 1983, the FERC budget request is $92.5 million, to be partially offset by approximately $60 million from fees and other charges, assuming favorable consideration of the FERC user fee legislation by the Congress. The duties of the ERA and OHA will be divided between the Departments of Justice and Commerce under the reorganization plan. The Department of Justice will carry out the greater part of the adjudicatory activities of the OHA, as well as the petroleum regulatory compliance program, which seeks to identify and obtain redress for violations which occurred during the period when price and allocation controls were in effect on crude oil, residual oil and refined petroleum products. The budget request for the Department of Justice's energy regulatory activities is $18 million. We believe this funding level will be adequate to support a vigorous enforcement effort. As has been said many times before, there will be no amnesty for those who have obtained unlawful benefits.

The Department of Commerce and the Federal Energy Regulatory Commission will exercise the remaining responsibilities of the OHA and the oil and gas operations program currently housed in ERA.

## DEPARTMENTAL ADMINISTRATION

Funding requirements for Departmental Administration overhead activities are reduced in FY 1983, due largely to a decline in the number of Federal employees resulting from the elimination of unnecessary energy activities and the reduction of overhead anticipated with the elimination of the Department of Energy as a cabinet level organization.

Also, certain policy and management personnel once budgeted for in Departmental Administration are now proposed in the budgets of the operating activities they support. The budget request for FY 1983 is $162 million, compared to $267 million in FY 1982.

Mr. Chairman, I believe the FY 1983 budget request for Federal energy programs will permit us to carry out those essential energy tasks which are unique to the Federal Government, while leaving the remaining energy responsibilities to the genius and energies of the American people.

### BUDGET PRIORITIES

Chairman HATFIELD. Thank you very much, Mr. Secretary.

Mr. Secretary, the fiscal year 1983 budget that you have presented here is down about 10 percent overall, but I think unless one looks at the individual accounts, that picture can be misleading. I refer specifically to the preeminence of atomic energy to the detriment, even to the exclusion of all other alternatives. As I view the budget that you have presented for fiscal year 1983, about 90 percent of the proposed budget is devoted to nuclear-related power programs or nuclear warhead activities.

This is, in my view, a shortsighted—even blind—policy which does not even attempt a balanced approach which can lead to more energy self-sufficiency.

Let me give some comparisons. In fiscal year 1981 your Department budget allocated about 10 to 15 percent of the R. & D. budget to each of the conservation, fossil fuels, solar, and renewables program areas. Yet in the 1983 budget, which you are representing here today, you allocate less than 3 percent to fossil fuel, less than 2 percent to solar and renewables, about one-half of 1 percent to conservation. All of these programs have been cut a minimum of 80 percent since 1981.

Again, I emphasize that I consider this to be bad policy. Even within your own agency, the Energy Research Advisory Board gave you a report entitled, "Federal Energy R. & D. Priorities", that indicated fiscal year 1983 budget priorities are misplaced.

Why did you request the study if the results, particularly in the conservation areas, were totally disregarded?

Secretary EDWARDS. Senator, as you know, the ERAB advisory group advises us on a lot of things and it is one of the inputs that we use in our decisionmaking process. As we look at the variety of mixes that we could place money into, we feel that, for example, conservation is driven by price. We have had tremendous conservation in this country in the last few years. As a matter of fact, in a recent period of time we conserved seven times as much as we found in new proven reserves.

So something is working and, Senator, we feel that the price is working more than all of these programs in conservation that we pour in. As we are trying to fight to bring about a decrease in the deficits we find that this is one of the areas that, in our judgment, is the best way to cut the budget down.

Nuclear has a higher payoff in the long run than some of these others.

### FRENCH NUCLEAR PROGRAM

For example, Senator, let's look at France. Unfortunately, in recent years we have not pushed nuclear the way, in my opinion, we should have. France has taken up our technology and has run with it. This year in France they have doubled their nuclear production from about 50 billion kilowatt-hours to 100 billion kilowatt-hours. So they have really taken our nuclear energy leadership away from us.

This year, for the first time in several years, France has been a net exporter of energy, and last year they decreased their oil imports by 30 percent. And all of this, Senator, is due to the fact that they are taking our nuclear technology and putting it to use to produce energy for their country. We could do the same thing, and we have, to some extent, because this year there is a 15-percent increase in nuclear energy over last year.

The ERAB is, in fact, a group that we get a lot of information from. They have their input, but they are not the final decisionmaker.

Chairman HATFIELD. Are you suggesting then, Mr. Secretary, that we should nationalize our nuclear energy production like the French?

Secretary EDWARDS. No; I am not saying that.

Chairman HATFIELD. How else are we going to capitalize reactors that cost in excess of $1 billion each if we are not going to do it through nationalization?

Secretary EDWARDS. The private sector in this country has put between $130 to $150 billion into light water reactors.

### WASHINGTON PUBLIC POWER SUPPLY SYSTEM

Chairman HATFIELD. Are you familiar with some of the experiences we have had in the Pacific Northwest with WPPS 1, 2, 3, 4, and 5, which were undertaken by a consortium of utilities? And are you familiar with the bond market today and what interest rates are?

Secretary EDWARDS. Senator, I am very familiar with all of that. But you will have to admit that is not a nuclear energy problem out there; that is a management problem where they didn't manage their resources properly and got carried away. Those 88 utilities were sold on building not one nuclear reactor at a time, but five at a time. Inflation and interest rates went up. The Nuclear Regulatory Commission contributed somewhat to postpone the projects, and the first thing you know all of those projects were in trouble.

I think it is a management problem.

### NUCLEAR PLANT CANCELLATIONS

Chairman HATFIELD. What about TVA canceling five of their plants; is that a management problem?

Secretary EDWARDS. To some extent they overestimated the demand. TVA is in the business of expanding like a Federal bureaucracy.

Chairman HATFIELD. And other private utilities have canceled theirs. I think that what you are suggesting here is really the first step, the most major step toward socializing and nationalizing our whole energy program if you are going to tell this committee that the French are to be our model to develop nuclear energy.

Secretary EDWARDS. Senator, I have been accused of being a Communist and Socialist since I have been in Washington, but I hope the folks back home don't hear all this. They will think there is a great transition taking place. [Laughter.]

Chairman HATFIELD. Especially President Holderman.

### COAL PLANT CANCELLATIONS

Secretary EDWARDS. But you know, there have not only been nuclear plants canceled, about 15 to 25 coal plants have been canceled due to a combination of several things. One of them is the fact that we are conserving so much energy in this country. The demand is down. Another is that inflation is too high and interest rates are so high they can't continue without breaking the stockholders in these companies. The third thing is that the rate of return is not adequate to bring it all together.

### BUDGET PRIORITIES

Chairman HATFIELD. Getting back to my original question on balancing your R. & D. priorities for these various energy programs, it looks to me that you are obviously, in the allocation of your funds, sending a significantly greater part to the nuclear area, not only in terms of power reactor R. & D., but in terms of nuclear warhead production. Let me remind you that even during this budget-cutting exercise, we increased the nuclear weaponry program by $1 billion last year—by a billion dollars.

Now, how much oil are we still importing from the Middle East? How much dependency do we have in the Middle East today for their oil?

Secretary EDWARDS. Last week we imported the lowest amount in 11 years. It was about 3.6 million barrels a day.

Chairman HATFIELD. We are still in the high 20 and 30 percent of our dependency?

Secretary EDWARDS. About 15, our dependency from OPEC, but that is a little more, that is imported, yes.

Chairman HATFIELD. And we have a war between Iraq and Iran, we have political problems that could blow that whole area up in no time, very fragile situations, and yet the very alternatives that offer a possibility of breaking that dependency I see being slashed and excised from the budget.

Secretary EDWARDS. Senator, I guess it is a nuclear-based philosophy. The fact that commercial nuclear energy came up through the weapons program, and by its very nature acquired Government oversight and Government intervention. I think that there has been a lot of private investment in commercial nuclear energy, tremendous amounts of private investment. But I think we need to shepherd that on through. The weapons program, through a Presidential memorandum, is a 5-year program. We get the Presidential memorandum, and we have to supply the materials and the weapons for the Nation. The last 4 years, even prior to that to a lesser extent, some of our facilities for manufacturing these materials have gotten quite run down. We have to do some catchup maintenance on a lot of them.

Senator, I really don't make any excuses for us manufacturing those warheads, because I am very grateful that we had the capacity to manufacture them, because if we did not, we could all be working in the same salt mines in Siberia today.

I feel very strongly that is one of the few things that is protecting our freedom.

Chairman HATFIELD. I would only make one observation in what you refer to as the memorandum involving stockpiling, that there is no formal or informal input, to my knowledge, not even the Armed Services Committee, on that policy document, which is a very interesting observation, I think.

### ENERGY PROGRAMS REORGANIZATION

Mr. Secretary, let me shift to the question of the future of your Department.

As you know, Congress has already gone on record pretty clearly in opposition to the elimination of your Department, even before dismantlement legislation has been presented.

That issue, Mr. Secretary, is dead in this Congress.

Secretary EDWARDS. I hope that is an opinion and not fact, Senator.

### PROGRAM TERMINATION THROUGH STAFF REDUCTIONS

Chairman HATFIELD. That is a political fact of life. Mr. Secretary, the Senate Budget Committee has recommended level funding for most of the DOE programs which are proposed for further reduction and termination in the 1983 budget.

Let me assure you that you will be receiving more money from the Congress through the appropriations and budget process than the President has requested. Are you prepared, Mr. Secretary, to carry the legislative direction and intent and to see that adequate staff levels are retained in your Department to carry out such congressional will or will there be continued de facto dismantlement through the staff reductions that are occurring in your Department today?

Let me give you an example. Fossil energy officials announced last week that staff reductions in your Department will cut fossil programs from 254 full-time equivalents to 100 full-time equivalents before Congress acts on the fiscal year 1983 budget this summer; State and local assistance is projected to reduce force from 161 full-time equivalents to 62 full-time equivalents by October 1; conservation R. & D. will be reduced from 269 full-time equivalents in 1981 to 43 full-time equivalents in 1982, to 29 full-time equivalents in 1983. Solar energy, likewise, will be cut from 145 full-time equivalents in 1981 to 70 full-time equivalents by October 1 in fiscal year 1983.

Are your staff projections based upon the President's fiscal year 1982 budget request or are they based on current appropriations as enacted into law or by some other criteria?

Secretary EDWARDS. Senator, I want to make sure that I give you the correct answer.

Chairman HATFIELD. Please confer. I cite from a memorandum in response to the Energy Committee on those proposed reductions of staff.

Secretary EDWARDS. Senator, I think those proposed reductions relate to 1982 budgets rather than fiscal year 1983, if you check your heading there. Our reductions that we are discussing now relate to the fiscal year 1982 budget. We are not making any reductions. As a matter of fact, we are trying to hold on to as many people as we can until we see what we have to work with in fiscal year 1983, and if our fiscal year 1983 recommendations are accepted, then we will further reduce our personnel there.

These that you quoted relate to fiscal year 1982, purely a management——

Chairman HATFIELD. You have a footnote on your memorandum, it says:

> Per fiscal year 1983 budget request, projected DOE fiscal year 1982 end strengths are subject to a judgment based on the status of Federal energy reauthorization in the fiscal year 1983 budget.

What we are talking about here are projections which will carry over into the fiscal year 1983 period unless you are dismantled de facto before that.

Secretary EDWARDS. Mr. Heffelfinger is Assistant Secretary for Management and Administration. Could I ask him to respond to those figures so we have a complete understanding?

Chairman HATFIELD. Are you familiar with this memorandum, Mr. Heffelfinger?

Mr. HEFFELFINGER. I don't know that I am specifically. Let me see if I can answer. The Department anticipates no reductions of Federal employment in 1982 in anticipation of the 1983 budget request from the President to the Congress. The only reductions that are contemplated in fiscal year 1982 are those that are required by virtue of lack of funds to carry out the fiscal year 1982 levels. But no reductions are anticipated for fiscal year 1983 to be accomplished in fiscal year 1982.

We are going to wait until we see what the dollars are that are available to us before those reductions occur.

Chairman HATFIELD. That is my question—you are not going to make any reductions unless or until Congress acts on fiscal year 1983?

Mr. HEFFELFINGER. That is correct.

Chairman HATFIELD. I appreciate that assurance.

Secretary EDWARDS. I thought that is what I said but he says it more clearly.

## FISCAL YEAR 1982 STAFFING LEVELS

Chairman HATFIELD. Are you aware that several memos that have been exchanged between Deputy Assistant Secretaries and Assistant Secretary Tribble state that, "Current and projected staff levels are insufficient to effectively administer certain programs in light of increased Federal appropriations"? Would you care to comment on those statements?

Secretary EDWARDS. Which are we talking about, fiscal year 1982 or fiscal year 1983?

Chairman HATFIELD. We are talking about fiscal year 1982.

Secretary EDWARDS. Senator, I am aware of some problems that we may have along this line in fiscal year 1983. I am not aware of these memos that you mentioned. But I was of the opinion that Mr. Tribble had said on a couple of occasions that we had enough resources to carry out his responsibilities in fiscal year 1982. If he is referring to fiscal year 1983——

Chairman HATFIELD. Would you supply for the record any documentation you have, at subprogram level, any evidence to refute that premise that there is insufficient staff to carry out these programs?

Secretary EDWARDS. We will be glad to.

[The information follows:]

### CONSERVATION AND RENEWABLE ENERGY STAFFING

Questions had been raised by the staff concerning the ability of the Program Office, particularly the State and local programs in the field office, to administer the increased program levels provided in the fiscal year 1982 appropriations. After these concerns were reviewed, the Department provided conservation and renewable energy with additional fiscal year 1982 staffing of 71 full-time equivalents (FTE) to meet these requirements.

Secretary EDWARDS. We are running it pretty thin in our Department. There is no question about that. We are trying to keep it close and to save money everywhere we can.

### REDUCTION IN FORCE ACTION

Chairman HATFIELD. Let me approach this subject from another angle. Is the Department considering any reductions in force that it may issue any time prior to the enactment of the President's fiscal year 1983 budget request? We have picked up some information within your Department that reductions will be issued in July to take effect October 1, 1982, in order to meet the 90-day notification requirement and avoid congressional appropriation actions.

Secretary EDWARDS. Let me get Mr. Heffelfinger to answer that for you.

Mr. HEFFELFINGER. The only reductions in force contemplated in fiscal year 1982 are those required because we don't have funds in fiscal year 1982. It is not anticipated that there will be any notices or reductions in force processed to occur in fiscal year 1982 in anticipation of actions in fiscal year 1983 until such time as we know with finality what our program level and our full-time equivalent levels are for 1983.

Chairman HATFIELD. Will you give us the figures on the deficiency you face to carry out those programs in fiscal year 1982 that would force you to reduce any staff in order to meet those limits that you have in funding?

Mr. HEFFELFINGER. Absolutely; yes, sir.

[The information follows:]

### STAFF REDUCTIONS

Since the hearing on April 14, 1982, the Department has submitted a proposal to the Congress to resolve known funding problems that could result in a reduction in force. The proposal includes a $15 million transfer appropriation requiring approval by the Congress to solve a serious funding problem in departmental administration. However, it is possible that several organizations may conduct staff reductions as a result of decreases in workload, reduced program scope, or reorganizations designed to increase efficiency. We anticipate that the General Counsel, the Office of International Affairs, and Fossil Energy will be among the organizations that will be conducting staff reductions in fiscal year 1982 for one or a combination of these reasons. The magnitude of the reductions, if any, is still uncertain and will depend on attrition as well as on further management analyses.

## BARNWELL REPROCESSING FACILITY

Chairman HATFIELD. One last question. Let me turn to Barnwell a moment.

Mr. Secretary, the conference report which accompanied the fiscal year 1982 appropriations bill stated that, "The conferees agree that no additional funding will be considered for the Barnwell program after fiscal year 1982."

Allied Corp. has decided to take a tax writeoff of the Barnwell plant and both Allied and General Atomic have concluded that reprocessing of spent fuel is commercially impractical.

In light of these developments, what is your justification for reversing the President's earlier decision and asking Congress to provide funding for the Barnwell facility?

And second, what is your position on the Federal purchase of the facility? And do you have any figures as to the estimated cost for the Federal Government to purchase and operate the facility? And what current negotiations or incentives are going on at the moment to help private industry take over, perhaps, and operate Barnwell?

Secretary EDWARDS. Senator, just to lay the groundwork, I think, personally, that sooner or later it will pay this country to get into the reprocessing business. There are many advantages to reprocessing and we can go into those if you like a little bit later. I, coming from the State of South Carolina, was very much acquainted with the Barnwell plant.

I often wish it were not in my State, because I have been accused of pushing the program because one of the plants is in my State. But, no matter where it is, I think, ultimately, we are going to have to reprocess spent fuel for a multitude of reasons.

Now last year the President was clearly on record as being in favor of reprocessing. He felt the private sector should get back into it. The private sector was, at one time, in the business before government destroyed the investment of—depending how you figure the investment today, it runs between $350 and $450 million. But it is a very important national asset and I say "national." I was quoted in my hometown paper as calling it a natural asset, but it is a national asset and I think it is one that we ought to keep on line because it is the cheapest way we can get into the reprocessing business.

And so, I was trying to get that money in the President's budget last year. I failed because the President was convinced by OMB that the private sector should do it. This year I think the President realizes more fully the importance of it and he allowed me to place it back into the budget. It is a rather interesting reaction. For years and years it has not been in the Presidental budget. It has been put in the congressional budget. This year it is in the Presidential budget, and it may not be included in the congressional budget. It is a reverse of the activity of the previous year. Some reasonable, responsible research of that nature can be carried out at the facility. An accounting of plutonium and nuclear materials—the type of research that we would be doing somewhere. We would do the research somewhere, anyway. If we can use that facility to do that research and still maintain it and keep it from being written off and bulldozed; and if we could get a private-sector group or a combination private sector-Government group to come in and get back into the reprocessing, I think it would be a good investment on the part of the Government.

These are basically my thoughts on Barnwell.

I am sure you are acquainted with what happens when you reprocess. Everybody is in favor of recycling materials. They recycle beer cans and glass, but for some reason we are against recycling spent fuel rods. When you take that spent fuel out of the light water reactor, for example, it has about 40 to 50 percent of the energy left in. We can then do one of two things. We can take it and bury the whole thing in a geological formation, or we can recycle it and get the remaining energy values out of these rods and bury the waste.

There is some question as to whether it is economically feasible because there is no price on plutonium. How do you figure the price of plutonium?

Chairman HATFIELD. I am not arguing the point of reprocessing, but based on the memorandum of March 20, 1981, which says:

> I do not believe it would be appropriate for the Federal Government to acquire the Barnwell plant or to finance construction or operation of any of its facilities.

Secretary EDWARDS. What year was that?

Chairman HATFIELD. I take it, then, the President has taken a 180 degree on this?

Secretary EDWARDS. That was right after we finished our debates whether the private sector should get back in it. The President in his directive to me has directed me to see what we can do to get some private-sector involvement in reprocessing and this is the way to hold it on line until we get some private-sector groups involved in it.

Chairman HATFIELD. Isn't this really a CETA program for engineers. [Laughter.]

Secretary EDWARDS. You might look at it that way, Senator. I look upon it as preserving the national resource. I would hate to tear it down this year and have to build it again, 5 or 10 years from now.

Chairman HATFIELD. Then the $10 million is for a holding action?

Secretary EDWARDS. That is for holding actions and to do some responsible research at the same time. This is not throwing $10 million——

Chairman HATFIELD. I should say $40 million, because this is the fourth year in a row we have been in this kind of indecision, including the President who has taken a 180-degree turnaround on what he did in 1981.

Secretary EDWARDS. What he said in 1981 and then in 1982 is the need for getting into the reprocessing business somehow. He instructed me to see if we can set up some private-sector group to get into the reprocessing business. In the meantime, he and I both would like to maintain that facility and keep it from being bulldozed while we try to get a group of private sector investors to come in and use that facility to reprocess spent fuel rods.

Chairman HATFIELD. I don't agree with the idea of the transition. I wish we had the same kind of support for a transition from the public to the private sector in the solar, conservation, health and welfare, and some of the others that have been chopped out without any transition or CETA program as we have in this case of the Barnwell $10 million. That is an observation.

Secretary EDWARDS. I don't know if that is a backhanded compliment you are throwing me or not.

Chairman HATFIELD. I think you are an extraordinary man.

Secretary EDWARDS. One of the advantages I would like to point out in reprocessing this spent fuel is that you reduce the volume of the radioactive aspects that are contained in it to 10 percent of the original volume. You can reduce the whole radioactive portion to 10 percent of its original volume. Then you fold that into borosilicate glass; 25 percent of that waste would be 85 percent glass, and be emplaced in a container. It is insoluable. The container would then be buried in an appropriate geological formation, and that settles the case for nuclear waste. So it helps an awful lot in so many ways to reprocess it.

Chairman HATFIELD. I think we can get a lot more for our money to take that $10 million and put it into conservation.

Secretary EDWARDS. We are conserving seven times what we have added in new proven reserves. And the market is driving that conservation. It is being driven by the market.

Chairman HATFIELD. I still think you get more by honey than a club.

Secretary EDWARDS. And I appreciate your being so nice to me. [Laughter.]

Chairman HATFIELD. Senator Stennis.

Senator Stennis. Mr. Chairman, I understand we might have a vote in a few minutes.

I am interested in the points you mentioned. As I said before, I really regret to see the dismantlement of this Department. I was just thinking about it in terms of the future—we may have to return to it, but I don't have any further questions now, Mr. Chairman.

Chairman HATFIELD. Senator Abdnor.

### IMPORT DUTY ON IMPORTED CRUDE OIL

Senator ABDNOR. Can I get off that subject for a second; away from the budget? Something that crops up in the news very frequently, Mr. Secretary, is a proposal apparently originated in the Congress suggesting the imposition of $3 duty on foreign crude oil.

Do you have any thoughts on that?

Secretary EDWARDS. I have some very strong thoughts on it.

Senator ABDNOR. Are you endorsing it?

Secretary EDWARDS. I am not endorsing it in any way. I am totally against it. It sounds great: Let the foreign countries pay our tax bill. But what will happen is that the price of domestic oil will rise to whatever the imported price is and it will be another windfall for the oil companies. But more importantly, it will slow our recovery from the recession because one of the great parts of the decrease in our inflation rate has been the decrease in the cost of energy.

Another thing is that it distorts the market. I was down in Mississippi visiting that great refinery at Pascagoula where they are investing $1.5 billion to upgrade their refinery so that they can handle heavier high-sulphur crudes, and that is the thing we really want done.

If that import duty passes, what that is going to do is to keep them from recovering their investment because they are depending upon importing this cheaper crude, heavier, high-sulfur crude. In fact, they are not even going to run their own sweet crude through this refinery, because they have such a big investment they can't afford to run these heavier refined oils through it. An import tax will destroy the market and stop the development of these more sophisticated refineries that can handle the other, high-sulfur crudes.

Senator ABDNOR. In the event something like that did happen, what will that add to the cost of a gallon of fuel?

Secretary EDWARDS. I think an increase of $5 a barrel adds about 11 or 12 cents to the price of a gallon of gasoline. Let me get that figure for you.

Senator ABDNOR. It is more than just a few cents?

Secretary EDWARDS. Oh yes.

Senator ABDNOR. It will affect everyone, but really raise havoc in the field of agriculture. We have user fees that only add so much more to it. I wanted everyone to be aware of that.

Secretary EDWARDS. I got a figure of $5 a gallon import will add 14 cents a gallon to gasoline.

Senator ABDNOR. That is the first time I have seen that figure. Can you imagine what that user fee will amount to?

Secretary EDWARDS. Senator, another thing you have to look at is the fact that we are just getting out of the oil regulatory apparatus and that will put us back into the same business again.

Also, I was reading that one of Goldman Sachs' economists pointed out that each dollar per barrel that oil falls in cost adds $5.5 billion to the incomes of American working men and women. The spot market has fallen $8 and if that were incorporated into the contract market, it would be the equivalent of about $45 billion back to the incomes of American people.

And I get really excited when I hear that, and when you see the price falling and all this happening, it may be that is the catalyst that we have been needing to get us back out of the recession again.

By the way, that return in incomes to the American people exceeds the July tax cut amount. That is what Goldman Sachs' economist was pointing out. It is exciting to see the economic benefit of the fall in energy prices. For us to turn around now and kill that goose that is laying that golden egg will be a tragedy in my opinion.

Chairman HATFIELD. It could increase conservation though.
Senator Burdick.

## GRAND FORKS ENERGY TECHNOLOGY CENTER, N. DAK.

Senator BURDICK. Thank you, Mr. Chairman.

Mr. Secretary, you stated before another subcommittee that the Department intended to terminate funding for the Grand Forks Energy Technology Center. You also indicated at that time that you were negotiating with the University of North Dakota about transferring the facility to the university. Can you comment on the current status of these negotiations and the timetable involved? And can you explain to me what will happen to the career Government employees at the center if the facility is transferred?

Also, how is the Federal financing to be handled and will it be gradually phased out funding or a sudden termination in fiscal year 1983?

Secretary EDWARDS. Senator, that final decision has not been made yet. As you know, we have five centers and we are trying to reduce those five to two and fund those two rather adequately. We are trying to find out what could be done with these centers and in some areas we would like to turn them over to educational institutions to continue them with continued support, with some research moneys at a somewhat reduced level to these centers under the auspices of some educational institution or, in some cases, some private-sector involvement.

So that decision has not been made. We are working toward that end, as you have described. Some of the communities are rather excited about what we are planning and they are helping us bring about that transition. I think that some good will come out of it as we try to reduce our budgetary responsibility.

Senator BURDICK. Are there any immediate plans on the phaseout of the employees' termination?

Secretary EDWARDS. Senator, we have no immediate plans right now. In fact, suppose I get you a sheet on that from our Assistant Secretary, Jan Mares, that will give you a detailed discussion of what the plans are and the relationship to the employees and the whole program. I will provide that to you for the record.

[The information follows:]

### STATUS REPORT ON GRAND FORKS ENERGY TECHNOLOGY CENTER

The Grand Forks Energy Technology Center is one of the DOE centers being considered for termination of direct Federal operation with the subsequent separation from Federal service of a majority of the staff. The University of North Dakota (UND) and the community are very interested in accepting a transfer of facilities for continued operation to preserve the history and the capability of the center in low-rank coal research. Very positive discussions are proceeding between the center and UND in drafting a proposal for DOE consideration. The UND expects to form a nonprofit corporation subsidiary which would own and operate this research center as a client-sponsored contract research facility. Details of corporate form, organizational structure, and research program are still being developed for the UND proposal, which is expected to be completed in the very near future.

No timetable for the transfer of the center has been established, but out goal is to affect the transfer shortly after October 1, 1982. No decision on implementation will be made until a negotiation agreement is reached on the disposition of real and personal Federal property.

The impact of closure on the present career Government employees is currently being evaluated by DOE personnel offices. In general, several possibilities exist for these employees. The majority are expected to be recruited to fill new positions within the new UND Research Corp.; some may retire; a few may be retained in a new Federal field office; and some may fill positions in other Federal agencies. The number of employees without prospects of continued employment is small, but exact impact is not yet known.

Termination of Federal funding of research activities at Grand Forks is not contemplated for fiscal year 1983. If the laboratory is turned over to the university, it is anticipated that Federal funding of research activities at Grand Forks will continue for several years, allowing the new nonprofit corporation to become self-sufficient in obtaining research funds from private and Government sources. The method of such funding is still being determined and will be a part of any negotiated agreement that would lead to the closure of the Grand Forks Energy Technology Center.

Senator BURDICK. In other words, there is still some uncertainty in the area—this matter has not been settled with the University of North Dakota?

Secretary EDWARDS. That is correct.

Senator BURDICK. Nothing firm about the employees?

Secretary EDWARDS. Not to my knowledge. If there is any change in that, we will let you know immediately. Negotiations have been going on and the last I heard that was the situation as they exist.

Senator BURDICK. Then the status quo will be maintained until 1983?

Secretary EDWARDS. Probably so.

Chairman HATFIELD. Senator Mattingly.

Senator MATTINGLY. I would like to take this opportunity to welcome Secretary Edwards.

Secretary EDWARDS. Thank you.

### DISMANTLEMENT OF THE DEPARTMENT OF ENERGY

Senator MATTINGLY. I am glad to see the overall proposed reductions in the Department of Energy 1982 budget. I guess my only regret—I am sure it is shared by you—is that dismantling of the Department of Energy is taking so long. I know that you are as convinced as I am that the key of energy independence in this country is the removal of Federal intrusion into the marketplace. The administration should be commended for the steps it has taken in the directions of restoring the marketplace initiative, but I must add that I believe that more could be done to hasten the day when the complete market forces are at work in all aspects of energy production in the United States.

I know that there are some people within the Congress who oppose energy independence through the use of the free market system. However, I think those individuals and the special interests that they represent will not be allowed to stand between the goal of the energy independence and the means by which it must be accomplished in this Congress.

I would like to commend you, Mr. Edwards, for your many parts of this budget, especially in the area of nuclear defense activities. Certainly this is a proper role for various sectors of the Federal Government to be involved in, not only the Defense Department. Especially in the light of the fact that our adversaries around the globe seem determined to force an arms race down our throats, the proposed budget seems adequate. I am one of those who believe that we must show our resolve, and this means money in this area.

I would like to say in closing, as a member of the subcommittee I intend to scrutinize the budget carefully to see where additional reductions can be made.

One question I would like to ask you, are you going to become the college president before or after you dismantle the Department of Energy?

Secretary EDWARDS. It will depend on how much cooperation we get from the Congress.

Senator MATTINGLY. I hope you can do it before you leave.

Are you a member of the Synfuels Board?

Secretary EDWARDS. No, I am not. I am a member of the advisory committee to the board.

Senator MATTINGLY. You took one of my questions about the President's proposed salary, in case you know mutual friends of ours that are in that area, we should have them write the President saying we don't think their salary needs to be $135,000 a year.

Secretary EDWARDS. We can see if we get the President of the Synfuels Board to write that letter for you.

Senator MATTINGLY. I would like to say you are a man after my own heart, that you stand for the free enterprise system, and I would like to commend you for the work you have done since you have been with the Department of Energy.

Secretary EDWARDS. Thank you.

## ADDITIONAL PREPARED QUESTIONS FOR THE RECORD

Chairman HATFIELD. Thank you, Mr. Secretary, for your appearance here today. We appreciate your testimony and we have some other questions for the subcommittee, and also from Senators Schmitt and Hollings, which we will submit to you in writing. Thank you.

Secretary EDWARDS. Thank you, Senator, I enjoyed it.

We will be pleased to respond to the committee's questions.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY SENATOR MARK O. HATFIELD

## BARNWELL NUCLEAR FUEL REPROCESSING FACILITY

The Conference Report which accompanied the FY 1982 Appropriations Bill states that "The conferees agree that no additional funding will be considered for the Barnwell program after FY 1982." Allied Corporation has decided to take a tax write-off of the Barnwell plant and both Allied and General Atomic have concluded that reprocessing of spent fuel is commercially impractical.

Question: In light of these developments, what is your justification for reversing the President's earlier decision and asking Congress to provide funding for the Barnwell facility?

Answer: First, we would like to note that past instabilities and uncertainties in Government policies and regulations are largely responsible for perceptions regarding the practicality of commercial reprocessing. It will take time and a concerted Government effort to correct this situation. In the meantime, we would note a basis for optimism that it can be corrected and that commercial reprocessing can remain a viable prospect. In a paper presented March 23, 1982, at a conference sponsored by the Atomic Industrial Forum, Mr. Ashton J. O'Donnell, Vice President, Bechtel National, Inc., stated "assuming continuing favorable progress within the Administration, it is reasonable to anticipate a sound basis for proceeding with reprocessing in the private sector."

The Department's FY 1983 budget request does not seek funding for purchase of the Barnwell facility, thus does not represent a reversal of the President's earlier decision against Federal purchase of this facility. Rather, the budget request recognizes that a unique opportunity to conduct research and development exists at Barnwell and seeks to take advantage of this opportunity during a period when both Government and industry are attempting to define the necessary conditions for renewed commercial investments in reprocessing.

The Carter Administration ban on fuel reprocessing in 1977 stopped industrial efforts to complete the Barnwell plant. Since that time, work at the Barnwell plant has been in a research and development mode pending some final decision on the future of the plant.

Specifically, the Barnwell facility has allowed development and preliminary testing of advanced safeguards technology that would be capable, if employed in commercial reprocessing plants, of significantly improving the ability to assure that special nuclear materials a) will not be diverted from a reprocessing plant and b) that any significant losses or other system disturbances will be detected almost immediately (through near-real time accountability that provides hourly computerized measurements of plutonium inventories). The new safeguards technology systems feature the latest in computer technology, process monitors, intrusion detection devices, and access control systems. Both the Los Alamos and Sandia National Laboratories, capitalizing on advances previously made through work conducted for the defense programs, have been active participants in developing this new technology and designing the tests conducted at Barnwell to date to verify its performance. This work has been endorsed by the IAEA which stated:

> ". . . we give a high priority to the further development and testing (of the BNFP system). If successfully completed as projected, the extended field test should provide highly valuable developmental data, much of which could not be obtained in any other way, and should contribute significantly to the IAEA's ability to define a generally acceptable and effective safeguards approach for large scale reprocessing facilities. (The IAEA) is prepared to cooperate fully in any way in planning, implementation, or evaluation of this integrated test."

In addition, the work conducted at Barnwell is relevant to the updating and refinement of the Nuclear Regulatory Commission's regulations for material control and accounting requirements which are necessary if renewed licensing efforts for the Barnwell plant are to be attempted.

In FY 1983, the material accountability system components developed, modified, installed, and tested at Barnwell over the last four years will be integrated and tested as a complete system over a four-month sustained demonstration period. Based on earlier non-sustained tests of components, the system is expected to demonstrate its capability to meet detection goals of the IAEA which have long been believed unachievable. This demonstration should be of great interest and importance to all nations concerned about the threat to peace caused by the possibility of undetected diversion of weapons-usable materials. Specifically, the FY 1983 demonstration at Barnwell will provide a unique opportunity to move toward an international consensus on effective safeguards systems for fuel cycle facilities being built or planned throughout the world. Subsequent foreign use of this technology would provide an example of how nonproliferation objectives can be advanced by constructive leadership.

FY 1983 funding would provide the additional benefit of helping to keep Barnwell a viable commercial venture, pending Government and industry efforts to reduce major uncertainties relative to the economics of reprocessing and to create a more predictable, stable environment for its continuation. Failure to provide the limited funding requested will likely precipitate a decision by the present owners to abandon the plant, terminate employment of the existing staff, and write off the plant for tax purposes at a net cost to the Federal Government of about $100 million in FY 1983.

It is the Department's view that changed circumstances and the potential for obtaining new commercial investments in fuel reprocessing efforts should take precedence over the specific language in the FY 1982 Conference Report. We respectfully request that the Congress reconsider this matter and support the Administration's efforts to provide industry with a stable nuclear policy environment and the necessary confidence to move forward with the Barnwell plant.

Question: What is your position on federal purchase of the facility?

Answer: The President has indicated it is important that the private sector take the lead in developing commercial reprocessing services, and the Department fully supports this position. We plan to support industry efforts to develop reprocessing capabilities without Federal purchase of the Barnwell plant.

Question: What are the estimated costs for the federal government to purchase and operate the facility?

Answer: In a paper presented in September 1981 at an American Nuclear Society meeting, Allied General Nuclear Services employees estimated that the present replacement value of existing Barnwell facilities is well over $500 million. It was also estimated in that paper that modifications plus additions to the existing plant, including the addition of a plutonium conversion facility and waste storage and solidification facilities, would cost approximately $700 million. Plant operations have elsewhere been estimated to cost between $60 million and $100 million annually.

Having provided this information, we wish to reiterate the Administration's position that private industry should take the lead in developing reprocessing services and that there are no plans for the Federal Government to purchase and operate the Barnwell plant.

Question: What is the current status of negotiations to induce private sector participation in Barnwell?

Answer: The Department has not been involved in any negotiations relative to a takeover of the Barnwell facility. We have, however, been working with elements of the nuclear industry to identify barriers to commercial reprocessing and actions that might be taken to overcome these barriers. We have learned that actions are necessary to protect a reprocessor against investment losses due to possible future policy changes, to resolve regulatory barriers, to assure markets for plutonium, and to resolve issues concerning the form and timing for Government acceptance of wastes. We expect to provide recommendations for specific actions in these and other areas within the next several months.

## Staff Levels - Conservation and Renewables

Question: Are your staff projections based upon the President's FY 83 budget request or are they based on current appropriations as enacted into law, or some other criteria?

Answer: Our staff projections for FY 1983 are based upon the President's FY 1983 Budget Request.

## Funding for TMI Research & Development Program

Question: Mr. Secretary, you have stated that the federal role "is limited to necessary R&D" and "the costs of cleanup remain with the owner." -- Does this remain the Administration's position?

Answer: Yes. This remains the Administration's position. DOE's request of $27 million in FY 1983 will be used to continue its R&D program at TMI-2 that includes the Data Acquisition Program and Waste Immobilization and Reactor Evaluation efforts. The total cost to complete the DOE effort that started in 1980 and is expected to run to 1985-86 is estimated to be $123 million, $48 million for Data Acquisition and $75 million for the Waste and Reactor Evaluation program. As indicated in the recent GAO Report EMD-82-28 dated January 15, 1982, about half of these research and development funds are expected to offset the owners cleanup costs.

Question: You are now proposing to remove the entire core from the damaged reactor TMI-2, and your letter of April 7 indicates that any expense beyond the R&D effort will be reimbursed by the owners of TMI-2. -- What assurances can you give the Committee that these funds will be reimbursed - that the owner will be bound?

Answer: As indicated in my letter of April 7, 1982, negotiations on a contract to acquire the damaged core are just beginning and are anticipated to take 6 to 9 months. If a contract if successfully negotiated, the requested contract language for reimbursement will be provided. A copy of the Agreement in Principle between GPU and DOE, that will form the basis for this negotiation, is attached.

Question: Please provide the Subcommittee with a periodic report on the progress of your contract negotiations with the owners of TMI-2.

Answer: We will report to the subcommittee on the progress of contract negotiations with the owners of TMI-2. The current status is that we have just assigned the responsibility for negotiating this contract to our Idaho Operations Office.

### Law Suits

Question: Mr. Secretary, you are aware, I presume, that you and five other cabinet members, along with President Reagan, are being sued in New York (Southern) District Court for illegal impoundment of $21.85 million which has been appropriated by the Congress for the Solar Energy and Energy Conservation Bank. While the Solar Bank is principally under the auspices of the Department of Housing and Urban Development, you as Secretary of Energy are named to the Board of Directors of the Bank by the authorizing statute, and have a legal responsibility to fulfill in that regard unless Congress repeals the legislation or records the appropriations, which has not taken place.

- As Chairman, I am keenly interested in all cases of impoundment, but particularly with regard to solar and conservation funding. Does the Administration intend to contest this case in court or move forward with implementation of the program?
- What about other potential court cases against the Department on issues such as appliance efficiency standards and residential and commercial energy audits. Are you going to fight these issues in court or implement the programs as envisioned by Congress?

Answer: The lawsuit on the Solar Bank was filed in early April. The complaint is still being studied, and a response is being formulated.

The Department will continue to comply fully with existing requirements of law in carrying out its programs. Although it is difficult to speculate about potential lawsuits, the Department expects that its actions would be upheld if challenged.

## QUESTIONS SUBMITTED BY SENATOR HARRISON SCHMITT

Question: I am concerned about the Department of Energy's FY 1983 budget for the Community Assistance Program at Los Alamos.

In the assistance agreement signed in 1980, the DOE, the Los Alamos School Board and the Los Alamos County Council agreed to a formula to determine assistance payments to Los Alamos starting in FY 1983. This contract is to fulfill the Department's obligations under the Atomic Energy Community Act of 1955.

The Department's agreement with the Los Alamos School Board specifies $4.320 million as the base amount for application of the formula to compute the Board's assistance in FY 1983. Using the base figure and the contract formula yields a required payment of $4.6 million. The Department, however, has budgeted only $3.882 million for their Los Alamos Schools assistance payments.

Why was this contract ignored? Can we expect to have this error corrected by a supplemental request or a Departmental reallocation of funds?

Answer: The provisions of the contract were not ignored. Under the stringent budgetary conditions faced in developing the DOE budget, every effort was made to fund the critical needs of the Los Alamos community. We will continue to monitor the funds required to support the intent of the contract and take the action necessary to assure appropriate funding is made available.

Question: I am concerned about the FY 1983 funding for several ongoing projects budgeted through your Office of Minority Economic Impact (OMEI). Your FY 1983 budget contains no funds for this Office. What are the Administration's intentions regarding OMEI and the funding of several worthwhile projects in New Mexico that may be endangered by the proposed cuts, including a training program at the McKinley County, New Mexico Tribal Energy Development Cooperative and several data collection projects at the University of New Mexico if the Department of Energy is not eliminated?

Answer: This Administration is confident that the reorganization proposed for the Department of Energy will be approved. However, should the proposal be rejected, adjustments will be made in keeping with the approved program budgets for FY 1983 and the mandate by Congress. As to the funding of the projects in New Mexico, no determination can be made until the FY 83 budget becomes final.

Question: Also before the Department are several proposals, including a Hispanic-Navajo energy jobs training program at the Technical Vocational Institute in Albuquerque and a pending loan to the Navajo Bank under the Minority Bank Deposit Program. Will these proposals be eligible for funding if DOE is not eliminated?

Answer: The decision process for funding of specific proposals and projects will basically remain regardless of the status of the Department of Energy. Each proposal will be given careful consideration by the appropriate organizational unit and a decision on support of the proposal will be made in keeping with the available resources and the Administration's overall objectives.

Question: Do you intend to request additional funds to continue the Office of Minority Economic Impact?

Answer: The budget request for FY 1983 is based on the expected approval of the reorganizational proposal, therefore, there is no intent at this time to request additional funds as a separate line item for continuation of the Office of Minority Economic Impact.

Question: Can you keep me informed of the progress of the proposals before the Minority Economic Impact Office?

Answer: Mrs. Rosslee Douglas and her staff will be more than happy to contact you and inform you of the status of the proposals you have identified above.

Question: In addition, can you provide a list of the funds authorized, appropriated and eventually obligated for OMEI for FY 1982?

Answer: Listed below is the data on FY 1982 funds for OMEI.

| Authorized | Appropriated | **Obligated |
|---|---|---|
| see* | $1,400,000 | $2,279,417 |

Note: FY 1982 obligation includes $1,825,592 in FY 1981 carryover of which $1,600,000 was for the Loan Program.

* No separate breakout in the authorization bill. The funding included in overall amount provided for Program Administration.

** Obligations as of April 21, 1982 Appropriations excludes $595,000 operating expense.

## QUESTIONS SUBMITTED BY SENATOR HOLLINGS

### Funding for the Defense Waste Processing Facility (DWPF)

Question: How much is in the 1983 budget for construction of this facility?

Answer: The Department has requested $30 million for the Defense Waste Processing Facility (DWPF) in FY 1983. This will continue the design effort leading to the start of the actual construction in early FY 1984.

Question: Does the Department of Energy support the construction of the facility?

Answer: The DWPF is a high priority project within the Department. The importance of the facility is well recognized. Technology to construct and operate the DWPF is in hand. We fully intend to move ahead with this facility to immobilize the Savannah River Plant high level waste for ultimate disposal.

Question: This Subcommittee readily appreciated that by moving forward last year we could begin the immobilization of the waste in 1987 and thereby avoid $300,000,000 in unnecessary construction of additional underground storage tanks. What does the Administration intend to do with the ever-increasing nuclear waste at Savannah River?

Answer: The proposed schedule for the DWPF is to begin construction in FY 1984, and to complete construction and begin immobilizing the waste by late FY 1990. The immobilized waste will be stored temporarily on-site until a Federal repository becomes available. We are aware of the need for new waste storage tanks, if the DWPF is not constructed or if the above schedule is not maintained. Without the DWPF, 11 new waste storage tanks must be built by 1990 to maintain plutonium production at an estimated cost (escalated) of about $300 million. We are very sensitive to the problems of defense waste, and we will do what is necessary to safely continue operations at the Savannah River plant.

## Away from the Reactor Storage

Question: Mr. Secretary, you stated your unequivocal opposition to Federal away from reactor (AFR) storage before this Committee on February 19, 1981. The Administration repeated this opposition in a letter to Congressman Derrick dated September 30, 1981, from G.A. Keyworth, II, Director of the Office of Science and Technology Policy. The full Senate will soon consider S.1662, the National Nuclear Waste Policy Act of 1981, which includes a provision providing for Federal AFR storage. As you know, Senator Thurmond and I oppose this section and intend to offer an amendment to delete it from the bill.

Can we count on the Administration for support?

Answer. The provisions of S.1662 acknowledge that interim spent fuel storage is primarily the responsibility of utilities. Although the bill authorizes DOE to acquire, construct, or lease one or more licensed AFR facilities up to 2800 metric tons capacity, DOE could only accept fuel for interim storage should utility attempts for storage expansion fail. As such, it would be in the National interest for DOE to have this authority and capability, to prevent the possible shutdown of operating reactors, recognizing further that this capacity would, properly, be paid for by the utility industry. Consequently, the Administration does not oppose S.1662 because of its interim storage provisions.

## BARNWELL

In President Reagan's March 20, 1981, memorandum for the Secretary of Energy, the President stated the following:

> I have disapproved the Department's request for additional funds for use in connection with activities at the Barnwell, South Carolina, reprocessing plant. I do not believe it would be appropriate for the Federal Government to acquire the Barnwell plant or to finance construction or operation of any of its facilities.

In October 1981, Allied Corporation announced it had decided to write off Barnwell Nuclear Fuel Plant (BNFP) as an asset and begin steps to shut down the facility. The Administration has now proposed additional funding for BNFP in its FY '83 budget.

Question: What are the Administration's plans for this facility?

Answer: First, we would like to note that past instabilities and uncertainties in Government policies and regulations are largely responsible for perceptions regarding the practicality of commercial reprocessing. It will take time and a concerted Government effort to correct this situation. In the meantime, we would note a basis for optimism that it can be corrected and that commercial reprocessing can remain a viable prospect. In a paper presented March 23, 1982, at a conference sponsored by the Atomic Industrial Forum, Mr. Ashton J. O'Donnell, Vice President, Bechtel National, Inc., stated "assuming continuing favorable progress within the Administration, it is reasonable to anticipate a sound basis for proceeding with reprocessing in the private sector."

The Department's FY 1983 budget request does not seek funding for purchase of the Barnwell facility, thus does not represent a reversal of the President's earlier decision against Federal purchase of this facility. Rather, the budget request recognizes that a unique opportunity to conduct research and development exists at Barnwell and seeks to take advantage of this opportunity during a period when both Government and industry are attempting to define the necessary conditions for renewed commercial investments in reprocessing.

The Carter Administration ban on fuel reprocessing in 1977 stopped industrial efforts to complete the Barnwell plant. Since that time, work at the Barnwell plant has been in a research and development mode pending some final decision on the future of the plant.

Specifically, the Barnwell facility has allowed development and preliminary testing of advanced safeguards technology that would be capable, if employed in commercial reprocessing plants, of significantly improving the ability to assure that special nuclear materials a) will not be diverted from a reprocessing plant and b) that any significant losses or other system disturbances will be detected almost immediately (through near-real time accountability that provides hourly computerized measurements of plutonium inventories). The new safeguards technology systems feature the latest in computer technology, process monitors, intrusion detection devices, and access control systems. Both the Los Alamos and Sandia National Laboratories, capitalizing on advances previously made through work conducted for the defense programs, have been active participants in developing this new technology and designing the tests conducted at Barnwell to date to verify its performance. This work has been endorsed by the IAEA which stated:

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In addition, the work conducted at Barnwell is relevant to the updating and refinement of the Nuclear Regulatory Commission's regulations for material control and accounting requirements which are necessary if renewed licensing efforts for the Barnwell plant are to be attempted.

In FY 1983, the material accountability system components developed, modified, installed, and tested at Barnwell over the last four years will be integrated and tested as a complete system over a four-month sustained demonstration period. Based on earlier non-sustained tests of components, the system is expected to demonstrate its capability to meet detection goals of the IAEA which have long been believed unachievable. This demonstration should be of great interest and importance to all nations concerned about the threat to peace caused by the possibility of undetected diversion of weapons-usable materials. Specifically, the FY 1983 demonstration at Barnwell will provide a unique opportunity to move toward an international consensus on effective safeguards systems for fuel cycle facilities being built or planned throughout the world. Subsequent foreign use of this technology would provide an example of how nonproliferation objectives can be advanced by constructive leadership.

FY 1983 funding would provide the additional benefit of helping to keep Barnwell a viable commercial venture, pending Government and industry efforts to reduce major uncertainties relative to the economics of reprocessing and to create a more predictable, stable environment for its continuation. Failure to provide the limited funding requested will indeed likely precipitate actions by the industry efforts to reduce major uncertainties relative to the economics of reprocessing and to create a more predictable, stable environment for its continuation. Failure to provide the limited funding requested will indeed likely precipitate actions by the present owners to abandon the plant, terminate employment of the existing staff, and write off the plant for tax purposes at a net cost to the Federal Government of about $100 million in FY 1983.

## DEPARTMENTAL ADMINISTRATION AND OTHER SUPPORT ACTIVITIES

STATEMENTS OF:

**WILLIAM S. HEFFELFINGER, ASSISTANT SECRETARY, MANAGEMENT AND ADMINISTRATION**

**R. TENNEY JOHNSON, GENERAL COUNSEL**

**ROBERT C. ODLE, JR., ASSISTANT SECRETARY, CONGRESSIONAL, INTERGOVERNMENTAL AND PUBLIC AFFAIRS**

**HENRY E. THOMAS IV, ASSISTANT SECRETARY, INTERNATIONAL AFFAIRS**

**JAMES R. RICHARDS, INSPECTOR GENERAL**

**J. HUNTER CHILES III, DIRECTOR, OFFICE OF POLICY, PLANNING AND ANALYSIS**

**ROSSLEE G. DOUGLAS, DIRECTOR, OFFICE OF MINORITY ECONOMIC IMPACT**

### INTRODUCTION OF WITNESSES

Chairman HATFIELD. I would now like to invite a panel to testify on departmental administration and other support activities. Mr. William Heffelfinger, R. Tenney Johnson, Robert C. Odle, Jr., Henry Thomas, James R. Richards, J. Hunter Chiles, and Rosslee G. Douglas, please come forward.

I believe this is the first appearance of this panel, with the exception of Secretary Heffelfinger, before our subcommittee.

I would like to take this occasion to especially welcome you into this dialog. Mr. Tenney Johnson is the General Counsel; Mr. Robert C. Odle, Jr., is the Assistant Secretary for Congressional, Intergovernmental, and Public Affairs; Mr. Henry E. Thomas IV, is the Assistant Secretary for International Affairs; Mr. James R. Richards is the Inspector General; Mr. J. Hunter Chiles III, is the Director of the Office of Policy, Planning, and Analysis; and Rosslee G. Douglas is the Director, Office of Minority Economic Impact.

Secretary Heffelfinger, how do you wish to proceed? Do you wish to let the lady go first, or do you want to go first?

### STATEMENT OF WILLIAM S. HEFFELFINGER

Mr. HEFFELFINGER. At the expense of being rude, I would like to start off, if I may, and give you a very brief overview and turn it over to the various members of the panel.

I appreciate the opportunity to appear before you today in support of the budget request for the program administration activities for fiscal year 1983.

### BUDGET REQUEST

The total fiscal year 1983 request for these activities is $181.3 million. This is a 41-percent reduction below the funding estimates for fiscal year 1982 and has been developed in support of the President's reorganization proposal.

Two appropriations fund these activities: Departmental administration, $162.4 million, which includes the program administration activities; and energy supply research and development, $18.9 million, which covers program costs for technical information services and inhouse energy management.

First, however, I will present a brief overview of the program administration budget request for fiscal year 1983 of $181.3 million,

## REORGANIZATION OF DOE PROGRAMS

In accordance with proposals to reorganize energy programs, these activities and related funds would be distributed as follows: Energy research and technology administration within the Department of Commerce, $171.7 million; Department of Commerce central organizations, $5.5 million; Department of the Interior, $1.8 million; and Department of Justice, $2.3 million.

The $181.3 million estimate includes $94.4 million for salary and related expenses, $64.0 million for support services, $10.0 million for inhouse energy management program, and $8.9 million for technical information services. Also included is $14.9 million for severance costs, $72.0 million for cost of work for others, and $82.9 million in offsetting revenues.

## PREPARED STATEMENT

I have provided for the record my full statement which includes a table that identifies program administration staffing levels by appropriation, organization, and successor agencies.

[The statement follows:]

## STATEMENT OF WILLIAM S. HEFFELFINGER, ASSISTANT SECRETARY, MANAGEMENT AND ADMINISTRATION, DEPARTMENT OF ENERGY

I am William S. Heffelfinger, Assistant Secretary, Management and Administration of the Department of Energy. I appreciate the opportunity to appear before you today in support of the budget request for the Program Administration Activities for fiscal year 1983. The total fiscal year 1983 request for these activities is $181.3 million. This is a 41 percent reduction below the funding estimates for fiscal year 1982, and has been developed in support of the President's Reorganization proposal.

Two appropriations fund these activities; Departmental Administration ($162.4 million) which includes the Program Administration Activities, and Energy Supply Research and Development ($18.9 million) which covers program costs for Technical Information Services, and In-House Energy Management.

Testimony will be presented by other principal spokesmen for six of the major areas within Program Administration, followed by my testimony for the balance of the activities. With me today are R. Tenney Johnson, General Counsel; Henry E. Thomas, IV, Assistant Secretary for International Affairs; Robert C. Odle, Jr., Assistant Secretary for Congressional, Intergovernmental, and Public Affairs; J. Hunter Chiles, III, Director of the Office of Policy, Planning, and Analysis; James R. Richards, the Inspector General; and Rosslee G. Douglas, Director of the Office of Minority Economic Impact. Each will address the budgets for their respective offices.

First, however, I will present a brief overview of the Program Administration budget request for fiscal year 1983 of $181.3 million. In accordance with proposals to reorganize energy programs, these activities and related funds would be distributed as follows: Energy Research and Technology Administration within the Department of Commerce, $171.7 million; Department of Commerce central organizations, $5.5 million; Department of Interior, $1.8 million; and Department of Justice, $2.3 million. The $181.3 million estimate includes $94.4 million for salary and related expenses, $64.0 million for support services, $10.0 million for In-House Energy Management Program, and $8.9 million for Technical Information Services. Also included is $14.9 million for severance costs, $72.0 million for Cost of Work for Others and $82.9 million in offsetting revenues.

Provided for the record is a table which identifies Program Administration staffing levels by appropriation, organization and successor agencies.

This concludes my introductory remarks. Mr. Johnson is prepared to speak to the activities of the Office of General Counsel.

Department of Energy

FY 1983 Budget

Program Administration Manpower Resources

Departmental Administration

| | | | FY 1983 | | | |
|---|---|---|---|---|---|---|
| | FY 1982 | FY 1983 | PROPOSED SUCCESSOR AGENCIES | | | |
| ORGANIZATION | TOTAL FTE | TOTAL FTE | ERTA | DOC | DOI | DOJ |
| Office of the Director, ERTA | 42 | 15 | 15 | ... | ... | ... |
| Inspector General | 159 | 159 | ... | 159 */ | ... | ... |
| General Counsel | 356 | 140 | 77 | 22 | 6 | 35 |
| Bd. of Contr. Appeals | 9 | 4 | 4 | ... | ... | ... |
| International Affairs | 101 | ... | ... | ... | ... | ... |
| Policy, Planning and Analysis | 137 | 10 | ... | 10 | ... | ... |
| Management and Administration | 1,372 | 659 | 571 | 51 | 24 | 13 |
| Congressional, Intergovt'l & PA | 155 | 27 | 18 | 5 | 2 | 2 |
| Power Marketing Coordination | 15 | 10 | ... | ... | 10 | ... |
| Operations Offices | 2,040 | 1,317 | 1,317 | ... | ... | ... |
| Total | 4,386 | 2,341 | 2,002 | 247 | 42 | 50 |
| Energy Supply Research & Development | | | | | | |
| Technical Information Center | 228 | 90 | 90 | | | |

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*/ Anticipates subsequent redistribution to also include DOI.

I will now present the balance of the Program Administration activities included in the Departmental Administration Appropriation and the Energy Supply Research and Development Appropriation budget requests. These activities include Management and Administration, the Office of the Director, ERTA, six multi-purpose Operations Offices, Technical Information Services, the In-House Energy Management Program, and the financial accounts of Cost of Work for Others and Miscellaneous Revenues.

MANAGEMENT AND ADMINISTRATION

Management and Administration includes funding for personnel salaries and benefits for supporting activities such as procurement, budget and financial management, personnel management, organization and management systems, project and facilities management, administrative services, ADP management, computer services and telecommunications management, contractor industrial relations, equal employment opportunity, and the executive secretariat. This also includes support service costs for all headquarters personnel. Of the $91.9 million requested in FY 1983, $26.4 million is for the salaries of 602 full-time permanent and 57 other-than-full-time equivalents. The related travel is projected at $1.0 million. Also included is $13.5 million for severance costs except for employees of International Affairs, and the Office of Policy, Planning, and Analysis.

The support services request of $51.0 million provides for headquarters space rental, supplies, transportation, communications, printing and security, and purchase of capital equipment.

## OFFICE OF THE DIRECTOR, ERTA

The request for Office of the Director, ERTA includes $649 thousand for salary expenses and travel costs.

## OPERATIONS OFFICES

Six multi-purpose Operations Offices are also funded within Departmental Administration in the amount of $62.4 million; $49.1 million is for salaries and related expenses; $1.4 million for travel expenses; and $11.9 million for space rental, supplies, transportation, communications, and related support services and capital equipment for the Operations Offices. Although the six multi-purpose Operations Offices are funded and staffed within Departmental Administration, they are essential in the management of projects and implementation of programs. These six multi-purpose Operations Offices perform a wide variety of program execution and project management functions throughout the country. The principal functions are technical direction or project management of nuclear research and development, energy research and defense programs activities; contract administration and day-to-day management oversight of Government-Owned Contractor-Operated facilities; design, engineering and construction management; procurement; health, safety and environment oversight, property and real estate management; labor relations; financial management; and management of related support services.

## TECHNICAL INFORMATION

The Technical Information Service Program, managed by the Technical Information Center in Oak Ridge, Tennessee, is a centralized technical information service for the Department's program managers and contractors. The program enhances the Department's energy research and development effort by collecting, managing, controlling and disseminating scientific, technical and engineering energy information. The FY 1983 budget request for the Technical Information Services Program is $8.9 million, which includes $8.5 million for operating expenses and $0.4 million for purchase of capital equipment.

## IN-HOUSE ENERGY MANAGEMENT

The FY 1983 request for In-House Energy Management is $10.0 million. The In-House Energy Management Program represents a continuing investment to improve the energy efficiency of DOE buildings, facilities and operations. This program continues the retrofits required under the National Energy Conservation Policy Act of 1978 and Executive Order 12003 of July 20, 1977. The program of energy saving retrofits proposed today has a payback period of 2.2 years with an annual energy saving to the Department of 200,000 barrels of oil equivalent. With this short payback period the program helps to reduce utility costs. We will also continue a program of conservation surveys to identify future retrofit projects and central plant studies evaluating the economic feasibility of fuel conversions and cogeneration of electricity, which reduces overall energy consumption. Because DOE is the Government's second largest user of energy, the potential for savings is substantial.

## COST OF WORK FOR OTHERS AND MISCELLANEOUS REVENUES

Cost of Work for Others covers materials and services to non-Federal organizations when such products or services are not readily available from the private sector. The FY 1983 estimate is $71.9 million. The Department will receive an estimated $82.9 million in Miscellaneous Revenues as reimbursements for this work. Revenues are also earned from the sale of by-products, such as reactor steam and special nuclear materials. Since these are by-products, there is no cost of work incurred.

Mr. Chairman, that concludes my portion of this presentation. My colleagues and I will be happy to respond to any questions you or the Committee members may have.

## BIOGRAPHICAL SKETCH

William S. Heffelfinger was confirmed Assistant Secretary for Management and Administration, U.S. Department of Energy (DOE), on May 13, 1981. As Assistant Secretary, Mr. Heffelfinger is responsible for all Departmental management and support functions. In addition to personnel and administrative management, these include responsibility for budgeting and financial management, contracting and procurement, equal employment opportunity, and scientific and technical information systems. Mr. Heffelfinger had served as DOE's Director of Administration since October 1977. In that position, he was the Secretary of Energy's principal adviser on the organization and management of the Department.

Prior to his DOE appointment, Mr. Heffelfinger served briefly as Associate Administrator for Management and Administration at the Federal Energy Administration, one of the Department's predecessor agencies. He also served as Director of the Transition Administrative Operations Office during the establishment of the Department.

In 1969, Mr. Heffelfinger joined the Department of Transportation (DOT) as Deputy Assistant Secretary for Administration. In 1971, he became Assistant Secretary for Administration at DOT, a post he held until 1977. Early in 1969, he served as Staff Assistant to the Assistant Secretary for Water and Power Development at the Department of the Interior (DOI).

From 1962 to 1969, Mr. Heffelfinger was Director of Program Review for the Martin-Marietta Corporation. He previously had served as Assistant Administrator for Administration at the Federal Civil Defense Administration, 1953-1960, and as Director of Administration for the Office of Civil Defense Mobilization in the Executive Office of the President, 1960-1962. Prior to that, he was an institutional business manager, Kansas State Orphans' Home, 1946-1953.

In recognition of his outstanding government service, Mr. Heffelfinger has received several of the most prestigious awards granted a Federal employee. While serving at the Federal Civil Defense Administration, he was nominated for the William A. Jump Award (1960). During his tenure at the Department of Transportation (1969-1977), he was the recipient of two Gold Medals for outstanding achievement from two Secretaries of Transportation and an award certificate from a third. Since his appointment to the Department of Energy, he has been awarded a sustained superior performance award (1979) and the Silver Medal for outstanding service in 1981.

Mr. Heffelfinger is a member of the American Society of Public Administration and the American Legion and is listed in Who's Who in America.

Mr. Heffelfinger was born and reared in the State of Kansas and attended Kansas public schools. During World War II, he served in the U.S. Army. In more recent years, Mr. Heffelfinger has resided in McLean, Virginia. He is married and has one daughter and two sons.

Mr. HEFFELFINGER. I would like to turn to the other members of the panel for their remarks.

Mr. Johnson is prepared to speak of the activities of the General Counsel.

### RESOURCES WITHOUT REORGANIZATION

Chairman HATFIELD. Before you do that, as each person presents their testimony, I would like to ask questions.

You indicate that the fiscal year 1983 budget is a reduction of 41 percent from fiscal year 1982 in support of the President's reorganization proposal; is that correct?

Mr. HEFFELFINGER. That is correct.

Chairman HATFIELD. If reorganization is not implemented, I am going to press you again on this previous subject: Do you have sufficient funding proposed in this budget to carry out program administration activities under the departmental administration?

Mr. HEFFELFINGER. If the reorganization is not approved?

Chairman HATFIELD. That is correct.

Mr. HEFFELFINGER. Departmental administration is basically support activities.

Chairman HATFIELD. Is basically——

Mr. HEFFELFINGER. Support activities. And the budget for departmental administration are those support activities that we determine are necessary to support the balance of the program activities as presented in the President's budget. If you have a program that goes up above the President's proposal, it requires additional support activity. If it goes down below the President's budget, you require less program support activity.

As an example, if you have a program that doubles what we currently have, it requires personnel staff to hire the people necessary; it provides for comptroller personnel to take care of the added cost, of paying the Department's bills; it requires additional legal support; and it requires added support to follow the program budget.

This budget is presented assuming reorganization and assuming passage of the President's budget as articulated in the message that he sent to the Congress.

Chairman HATFIELD. Do I understand your answer is "No"? [Laughter.]

Mr. HEFFELFINGER. If the reorganization is not approved and if the program dollars are not approved as have been recommended to the Congress, the program support isn't sufficient.

Chairman HATFIELD. So if reorganization is not implemented, you will not have, on the basis and the premise of this budget request, you will not have sufficient funding to carry out program administration activities, particularly activities under the departmental administration account?

Mr. HEFFELFINGER. Mr. Chairman, I will not try to play games with you. If you would include in that, "if reorganization isn't approved and if the programs are not approved at the level requested," my answer is "No."

If you tie it strictly to reorganization and do not tie your question to the level of programs that departmental administration supports, we have not done an analysis in anticipation of that event.

Chairman HATFIELD. Could you give me, then, an analysis that assuming—let me give you an assumption. Assuming level of funding, what is your estimate of the shortfall in relation to this budget that you are now talking about? Because the premise is that reorganization is not going to be implemented, because it is not going to be legislated.

Mr. HEFFELFINGER. Mr. Chairman——

### OMB CIRCULAR A-10

Chairman HATFIELD. Don't refer back to that memorandum from Mr. Stockman which restricts your response. It was then revised, then reissued to your Department as I understand. I have had a copy of both of them, and you can be assured that I am going to have a visit with Mr. Stockman regarding this matter. We are going to delay that question. I see it is an unfair position to put you in. I might include it in the record at this point, both the memorandum dated March 29, 1982, from Mr. Stockman which said you should not respond to questions or requests at appropriations hearings as witnesses and refrain from providing information and plans for appropriations that exceed the President's budget request.

And then I refer to the memorandum issued by the Department of Energy on April 1, 1982, which again cautions any witness from giving any responses to questions raised by Members of Congress or their staffs in hearings, meetings, correspondence, or by telephone. It will also include inserts and answers to Members and staff questions to be provided for the record subsequent to a congressional hearing, all congressional requests for capability statements, and all other congressional requests, formal and informal, for information on the use to which appropriations in excess of the President's request would be put.

It does say, "an exception"——

[Laughter.]

Chairman HATFIELD [continuing]. "to this provision is responses to questions dealing with what the Department requested from OMB, or what was requested in the Department's internal review budget."

I think these are classics. These will go down in political science technique books. I would like to go back in a political science classroom—this would be one of my prime examples of discussing the doctrine of separation of powers versus the mixing of powers. I won't put you in that situation, Mr. Heffelfinger, I admire you too much.

[The correspondence follows:]

### MEMORANDUM FROM JOSEPH J. TRIBBLE, ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY

APRIL 1, 1982.

To: CE deputy assistant secretaries, CE Office directors, and PM administrators.
From: Joseph J. Tribble, Assistant Secretary for Conservation and Renewable Energy.
Subject: Responsibilities for disclosure of budget information.

Attached is a memorandum from Deputy Secretary Davis which transmitted a memorandum from Mr. David Stockman amending OMB's Circular A-10. The message is quite explicit and self-explanatory. Please assure that each person in your organization who may, under any circumatances, be called upon to generate information of this nature is made aware of these instructions.

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## MEMORANDUM FROM R. KENNETH DAVIS, DEPUTY SECRETARY, DEPARTMENT OF ENERGY

APRIL 1, 1982.

To: Under Secretary, assistant secretaries, administrators, General Counsel, and Chairman, Federal Energy Regulatory Commission.

Subject: Responsibilities for disclosure of budget information.

A memorandum from David Stockman amending OMB Circular A-10 is attached for your information and guidance. This memorandum, dated March 29, 1982, amends paragraph 4.d of Circular A-10 to prohibit witnesses from providing plans for the use of appropriations in excess of the President's request.

In carrying out these instructions, the Department will interpret this prohibition to encompass both written and oral responses to questions raised by Members of Congress or their staffs in hearings, meetings, correspondence, or by telephone. It will also include inserts and answers to Member and staff questions to be provided for the record subsequent to a congressional hearing, all congressional requests for capability statements, and all other Congressional requests, formal and informal, for information on the use to which appropriations in excess of the President's request would be put.

An exception to this prohibition is responses to questions dealing with what the Department requested from OMB or what was requested in the Department's internal review budget. These questions may be answered even though the data provided could be interpreted as a plan to increase the President's budget. Where appropriate, these answers should include a statement of support for the President's budget.

The Assistant Secretary for Management and Administration should notify the cognizant appropriations subcommittees of these instructions and the Assistant Secretary for Congressional, Intergovernmental, and Public Affairs should take steps to inform the proper authorization subcommittees.

Addressees should insure that all program offices under their control which deal with congressional testimony and requests for information including detached elements such as field offices, laboratories, energy technology centers, and power administrations, are apprised of this policy.

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## MEMORANDUM FROM DAVID A. STOCKMAN, DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET

### CIRCULAR NO. A-10, REVISED TRANSMITTAL MEMORANDUM NO. 1

MARCH 29, 1982.

To: The heads of executive departments and establishments.

Subject: Responsibilities for disclosure with respect to the budget.

This transmittal memorandum amends paragraph 4.d of OMB Circular No. A-10, Revised, dated November 12, 1976. Paragraph 4.d is changed to read:

"4.d. In responding to specific questions on program and appropriation requests, witnesses will refrain from providing plans for the use of appropriations that exceed the President's request. Witnesses, typically, bear responsibility for the conduct of one or a few programs, whereas the President must weigh carefully all of the needs of the Federal Government, and compare them against each other and against the revenues available to meet such needs. Where appropriate, witnesses should call attention to this difference in scope of responsibility in explaining why it is not proper for them to support efforts to raise appropriations above the amounts requested by the President."

This change is effective immediately.

## STATEMENT OF R. TENNY JOHNSON, GENERAL COUNSEL

Chairman HATFIELD. General Counsel is next. Mr. Johnson.

Mr. JOHNSON. Thank you for welcoming me to this committee, and I appreciate it very much.

I would like to have my statement included in the record and make a short remark or two.

The Office of General Counsel is a support activity. It has no real program responsibilities other than the patent program, but it does get involved in most of what the Department does. Most matters have a legal content to them, and if they do, they are passed before the General Counsel's Office. I do sit with the Secretary, the Deputy Secretary, and the Under Secretary in overseeing the Department as a whole.

With regard to the Office of General Counsel, particularly as the Department programs decrease in scope, so, too, does the requirement for legal support decrease; perhaps not at the same pace, but it inevitably would follow.

We find that we can accomplish our task with significantly less staff than the General Counsel's Office has had in the past. The Congress has always appeared to pay attention to the level of lawyers in the Department, and if it is looking for reduction, our proposal will accommodate that wish.

### BUDGET REQUEST

Our appropriations request is $6.3 million. It is consistent with the reduction in program levels elsewhere and reflects ultimately the policy redirection of the Department toward long-term, high-risk R. & D., and the curtailment of regulatory approaches to the solution of energy problems in the country.

If the President's reorganization proposals were accepted, the Office of General Counsel would go largely to the Department of Commerce but a substantial part would go to the Department of Justice to carry out the remainder of the enforcement program that still is with us following the decontrol of petroleum product pricing.

I wish to say also that it has been a real privilege for me to work with the professional people in the Office of General Counsel. I think the professional level that they have attained is high indeed and I can assure you that the problems of legal character that come to us are considered carefully and dispassionately and without a hidden agenda.

I am also pleased with our record before the emergency court of appeals. We have had a number of important cases recently that should help us immeasurably in bringing about a conclusion in a good way to the enforcement program that we have had.

[The statement follows:]

## STATEMENT OF R. TENNEY JOHNSON, GENERAL COUNSEL, DEPARTMENT OF ENERGY

I am pleased to appear before you today to discuss the fiscal year 1983 budget request for the activities of the Office of General Counsel.

### THE OFFICE OF GENERAL COUNSEL

Before discussing our budget request I would like to summarize the responsibilities of the Office of General Counsel. The legal services provided to the Secretary and the Department as a whole, with the exception of the Federal Energy Regulatory Commission, encompass any matters before the Department carrying a legal dimension. These matters include administrative action, congressional activities, litigation, and internal legal affairs.

A few examples serve to illustrate the range of the Department's program activities that result in considerable legal work. We are very much involved in the legal aspects of the nation's nuclear programs. In the area of civilian nuclear waste management, we provide advice on the development of the Department's program, and we review and provide comments to the Congress in its deliberations on the various bills before it. In addition, this office is involved in legal support for the Clinch River Breeder Reactor program and the implementation of the West Valley Demonstration Project Act.

The environmental consequences of the Department's actions and policies require considerable expenditure of our legal resources. For example, General Counsel provides legal review of the numerous environmental impact statements prepared by the Department. Over 50 Environmental Impact Statements are being prepared by the Department for fiscal year 1983 projects. Other major environmental issues include the implementation of the hazardous waste management program and the remedial actions program to clean up contaminated sites.

A major legal effort was expended in the past year to further the Department's financial assistance programs, including the TOSCO, Union Oil, and Great Plains fossil fuel projects, as well as several alcohol fuel and geothermal projects. Considerable work will be required in this area and in efforts to terminate or restructure the Department's demonstration arrangements and the administration of outstanding grants or contracts, with an emphasis on close-out issues. These and other program support efforts also require ongoing involvement in patent and procurement functions, and other administrative legal services.

We also provide the legal support for regulatory review and reform consistent with more efficient federal government. This includes ongoing revision to regulatory programs that no longer are efficacious and implementation of specific Congressional and Executive directives. In addition to review of specific regulations, we also provide legal input to broader efforts, such as the Electric Utility Task Force Working Group.

In terms of litigation, we currently have 423 pending cases in litigation as part of the effort to bring the Emergency Petroleum Allocation Act enforcement program to a satisfactory conclusion. Many of these cases, to the extent they reach a judicial forum, require several years of legal effort in court. In addition to litigation work deriving from various regulatory programs, the Office of General Counsel represents the Department in numerous general litigation matters, such as radiation injury claims against the Government; cases involving challenges to rates set by the power marketing administrations, administrative and judicial hearings concerning personnel action; and other cases where the Department is a party in interest to the case.

Although many of these activities will require considerable legal work in fiscal year 1983, other activities will be greatly reduced or eliminated. Examples include: petroleum regulations, interpretations, and rulings, resulting from the President's decontrol of crude oil; work on synfuel projects transferred to the Synthetic

Fuels Corporation; mineral leasing activities returned to the Department of the Interior by the FY 1982 Interior Appropriations; the building energy performance standards program, made voluntary by the Reconciliation Act; reduced activities under the Fuel Use Act; and reductions in need for legal assistance attributable to reductions in outlay programs as proposed in the Department's budget. Reduction in these areas will permit us to accomplish our mission with a significantly smaller staff.

## FY 1983 BUDGET REQUEST

Mr. Heffelfinger has already provided you with staffing levels consonant with our total appropriations request of $6,315,000. This is consistent with parallel program budget items in general, reflecting the redirection of the Department's efforts towards long-term, high-risk research and development, and the curtailment of regulatory approaches to the nation's energy problems.

Consistent with the President's 1983 Budget, and his announced plans to reorganize the Department of Energy, the responsibilities of the Office of General Counsel would be transferred, upon the enactment of appropriate legislation, to the Department of Commerce, the Energy Research and Technology Administration within the Department of Commerce, the Department of Justice, and the Department of the Interior.

Mr. Chairman, that concludes my remarks. I will be happy to respond to any questions you or the Members of the subcommittee may have.

## STATEMENT OF ROBERT C. ODLE, JR., ASSISTANT SECRETARY, CONGRESSIONAL, INTERGOVERNMENTAL, AND PUBLIC AFFAIRS

Chairman HATFIELD. Mr. Odle.

Mr. ODLE. We have filed a statement for the record. I do want to mention that I have five offices under my jurisdiction, the Offices of Congressional Affairs, Public Affairs, and Intergovernmental Affairs; the Office of Consumer Affairs; and a policy office, called the Office of Competition. When I was confirmed, we had 216 people in those offices; today we have 135. Our spending was at the rate of $13 million a year. We are now spending at the rate of $7 million a year.

We have already made significant changes and reductions, I think without a corresponding reduction in services.

We believe as the Federal role diminishes and many specific energy programs are reduced, the need for many intergovernmental and consumer affairs activities are likewise reduced.

Accordingly, our budget request for 1983 is $2.2 million to support 27 full-time equivalent positions at the Department of Commerce, in a merged Department.

[The statement follows:]

## Statement of Robert C. Odle, Jr., Assistant Secretary, Congressional, Intergovernmental, and Public Affairs, Department of Energy

I appreciate the opportunity to appear before you today to discuss the FY 1983 budget for the Office of Congressional, Intergovernmental and Public Affairs. This Office has been responsible for developing, managing and ensuring coordination of relations with the Congress; news media; State, Territorial, tribal and local government officials; other Federal agencies; and consumer, business and citizen organizations; and for promoting competition in the energy industry.

### FY 1982 ACTIVITIES

During FY 1982 this Office's activities are focused on:

- Coordination of Departmental efforts related to the consideration and passage of new and revised legislation;
- Continued efforts to maintain effective communication with the public in order to clarify energy policies and programs that strengthen the nation's economy and security;
- Completion of comprehensive energy plans for the territories and Puerto Rico in implementation of the Omnibus Territories Act of 1980; and
- Advocacy of market-based solutions within DOE and analysis of the impacts of Departmental activities.

The Administration's energy policies encourage the efficient production and use of energy by reducing government intervention in energy markets. As the Federal role diminishes and many specific energy programs are reduced or eliminated, the need for extensive Congressional, intergovernmental, consumer and public affairs efforts is naturally diminished as well.

### FY 1983 BUDGET REQUEST

My budget request for FY 1983 recognizes these reduced requirements. A total of $2.2 million is requested. The funds requested are needed primarily to support 27 full-time equivalent workyears for the Congressional and public affairs functions. We consider our Congressional relations activities to be paramount and we will continue to provide you and your staffs with support.

In the public affairs area, emphasis will be placed on national press relations and agency business with the media; review and control of publications and audiovisual products; and management of agency exhibit activities. The remainder of the request will provide contractual support for public affairs activities. The following table summarizes the FY 1982 appropriations and the FY 1983 request:

($000's)

| | FY 1982 Appropriations | FY 1983 Request |
|---|---|---|
| Competition | $ 100 | $ 0 |
| Consumer Affairs | 100 | 0 |
| Public Affairs | 200 | 150 |
| Program Direction | 6,799 | 2,093 |
| Total | $7,199 | $2,243 |

## BIOGRAPHICAL SKETCH

Robert C. Odle, Jr., was nominated by the President on April 6, 1981, and confirmed by the Senate on May 13, 1981, as Assistant Secretary for Congressional, Intergovernmental, and Public Affairs, U.S. Department of Energy (DOE). In this position, Mr. Odle is responsible for coordinating the Department's legislative programs; activities involving State, local, and American Indian Governments; and public affairs programs.

Prior to his current appointment, Mr. Odle was Washington Corporate Affairs Representative for International Paper Company. Joining International Paper in 1976, he specialized in liaison with the Federal Government and represented the Company before the Congress on energy, environmental, regulatory, and wage-price issues.

From 1973-1976, Mr. Odle served as Deputy Assistant Secretary and Acting Assistant Secretary at the U.S. Department of Housing and Urban Development (HUD). While at HUD, his primary responsibilities involved the financial and operational management of single and multifamily housing programs and administration of the public housing program.

During 1971-73, Mr. Odle served as Director of Administration for the Committee for the Re-election of the President. He was a Staff Assistant to the President from 1969 to 1971.

Mr. Odle received a B.A. degree in political science from Wayne State University, Detroit, Michigan, in 1966, and was awarded a Juris Doctor Degree with honors from The Detroit College of Law in 1969. He is a member of the Delta Theta Phi Law Fraternity and the Michigan and American Bar Associations.

Born in Port Huron, Michigan, Mr. Odle currently resides in Alexandria, Virginia with his wife, the former Lydia Ann Karpinol.

## STATEMENT OF HENRY E. THOMAS, ASSISTANT SECRETARY FOR INTERNATIONAL AFFAIRS

Chairman HATFIELD. Mr. Thomas?

Mr. THOMAS. Thank you, Mr. Chairman and members of the committee.

I, too, would like to submit for the record my full formal statement and make a few comments at this time.

The international activities of the Department of Energy, in accordance with the statutes we presently are responsible for administering and our responsibilities to support the Secretary and the Department itself, have been very carefully considered in light of the anticipated proposal by the President for the reorganization of the Department's responsibilities.

Our budgetary request is in line with that anticipated proposal accordingly.

### INTERNATIONAL RESPONSIBILITIES

Mr. Chairman, the responsibilities that the Department has in the international area were highlighted in the President's message with respect to the anticipated dismantlement of the Department. I have had very close consultations on this subject with those in the Department of Commerce whom we would anticipate would assume these responsibilities. I am also working closely with those in the Departments of Treasury and State, the White House, and in the intelligence community, in this regard.

Mr. Chairman, if this proposal is indeed submitted to the Congress as we anticipated and it were acted on favorably, I could assure you, that we in the Administration are comfortable that all of the responsibilities that presently exist in the Department of Energy in the international area will be fully and completely carried out.

Mr. Chairman, I will be happy to respond to any questions you might have.

[The statement follows:]

## STATEMENT OF HENRY E. THOMAS, ASSISTANT SECRETARY FOR INTERNATIONAL AFFAIRS, DEPARTMENT OF ENERGY

It is a pleasure to appear before this Subcommittee to discuss the FY 1983 budget request for the Department of Energy's Office of International Affairs. Our funding request for $400,000 is in accord with the proposed reorganization of Federal energy programs administered by the Department of Energy.

### TRANSITION OF INTERNATIONAL ENERGY RESPONSIBILITIES

Let me reassure you that the Administration is planning an orderly transition of international energy responsibilities as part of the planned reorganization of Federal energy programs. The necessary international functions have been identified and the final reorganization plan will indicate their proper placement. This planning is based, of course, on the budget submitted by the President and a legislative package that will be submitted to Congress to reorganize the Federal energy functions. The reduction of funds and the reorganization are consistent with the Administration's desire to improve the effectiveness and efficiency of the Federal Government in carrying out its proper energy role.

On December 17, 1981, the President announced his intention to make the Department of Commerce responsible for our relations with international energy organizations such as the Nuclear Energy Agency and the International Energy Agency, as well as for coordinating the US response to international energy supply emergencies. The Department of Commerce will also assume responsibility for the negotiation and administration of bilateral agreements, a duty which has been performed by DOE and its predecessor agencies. The President's statement demonstrates his intent to ensure the continuity of our international energy activities and commitments during the transfer of responsibilities to Commerce.

## DEPARTMENT'S INTERNATIONAL ROLE

I would like to explain what DOE's international programs are and how they are administered. First, let me emphasize that DOE's international role differs from and is complementary to that of the Department of State. DOE's Office of International Affairs has a unique mandate and ability to provide specialized technical and analytical support to the Department of State. That support is based on a detailed knowledge of US domestic energy programs, the objectives of US international energy programs, and developments in international energy markets. DOE provides similar specialized advice to the President and to the Departments of Defense, Treasury, Commerce and the US Trade Representative, to ensure that US energy interests are carefully weighed in all appropriate international deliberations.

## PROGRAM ROLE AND RESPONSIBILITIES

The DOE Organization Act of 1977 establishes the overall policy role for the Office of International Affairs. This role is both analytical and representational. We provide the analytical base for policy decisions; for example, we closely follow international oil markets, including spot markets, pricing trends, patterns of sale, and the movement of crude oil. This information would be used by an operational crisis cadre in the event of an oil supply disruption. In cooperation with the DOE Office of Environmental Protection, Safety and Emergency Preparedness (EP), we analyze the full range of international energy emergency preparedness issues related to oil supply disruptions. The Office of International Affairs also provides policy and technical data support throughout the government on international natural gas issues such as European dependence on Soviet natural gas. We also provide support to the Economic Regulatory Administration in providing international analyses and interpretations related to DOE's energy data collection and publication requirements. This includes contributions to: the Weekly Petroleum Status Report; EIA's Annual Report to Congress; the annual report to the

IEA on US energy trends and policies; and periodic data collection related to participation in international organizations.

We represent the United States at the International Energy Agency (IEA) where the IA staff and those of other DOE offices participate in the Standing Groups of the IEA and its Governing Board deliberations. We also represent the US at the Nuclear Energy Agency (NEA), the International Atomic Energy Agency (IAEA), before civilian NATO bodies relating to emergency planning, and various working groups of the Economic Commission for Europe such as the Coal Standardization Group. Further, we sit on numerous joint committees and commissions under bilateral arrangements with key consuming and producing nations. With all of these groups, IA representation of US interests is done in close coordination with the Department of State.

The Atomic Energy Act of 1954, as amended, and the Nuclear Non-Proliferation Act of 1978 assign to the Department specific responsibilities in the areas of international nuclear cooperation and non-proliferation. These duties include participation in the negotiation of international agreements for cooperation in the peaceful uses of atomic energy and principal responsibility for concluding "subsequent arrangements" for the transfer of nuclear materials under such international agreements. For example, in the past year we have reviewed and acted on over 200 "subsequent arrangements", negotiated agreements for cooperation with several governments and international organizations that will support nuclear development with US technology, and created institutional frameworks for work on a strong non-proliferation regime.

Section 252 of the Energy Policy and Conservation Act provides an anti-trust defense for US oil company participation in the International Energy Program (IEP) that is administered by the IEA. The IEP Agreement commits the US to participate in an information program and an emergency oil sharing system. Without US oil company participation, the IEP's emergency sharing provisions would be ineffective. Our administration of the Section 252 recordkeeping and monitoring requirements, in cooperation with the Office of General Counsel, is essential to the participation of US companies, and, therefore to the functioning of the overall sharing system. We work with oil company representatives participating in the IEA's Industry Advisory Board, the Industry Working Party and the Industry Supply Advisory Group to ensure the readiness of the IEA's emergency mechanisms.

Pursuant to the Natural Gas Act of 1938, Section III, as amended by the DOE Organization Act, the Department determines that proposed natural gas imports and exports are not inconsistent with the public interest based on criteria that include energy security. The Office of International Affairs provides policy and technical support for the Economic Regulatory Administration and the Federal Energy Regulatory Commission in these areas. In the area of export control, IA exercises the DOE policy advisory opinion role in oil and gas production equipment and technology exports (Export Administration Act of 1969, Section 5(a)).

The Energy Security Act of 1980 requires development of an acquisition strategy to fill the Strategic Petroleum Reserve (SPR). We provide an assessment of the international implications of this strategy, in close cooperation with the DOE Office of Environmental Protection, Safety, and Emergency Preparedness (EP). Since EP is responsible for US energy emergency response measures, its orientation and expertise is primarily domestic. IA therefore works closely with EP to assure that its plans take into account ongoing international realities and that the US position before international energy bodies accurately reflects domestic energy emergency policy. This close working partnership has been in evidence in US representation at the various emergency planning groups of the IEA & NATO, the development of an SPR distribution management manual, and the oil acquisition strategy for the SPR. During an actual oil supply emergency, when it would be imperative that US domestic responses reflect both our international obligations and the rapidly changing international situation, this close working relationship would be critical.

In nonnuclear research and development, the Energy Reorganization Act of 1974 and the Solar Energy Research, Development, and Demonstration Act of 1974 establish mandates for international cooperative programs. The Department has over 100 cooperative energy R&D agreements and other commitments covering more than 260 projects. IA serves as the link so that in the initiation or termination of such programs reflect both foreign and domestic policy considerations. They are managed by the line programs but IA serves as coordinator for all parties, the U.S. Government, foreign nations and international organizations.

The Assistant Secretary for International Affairs presently serves as the Senior Intelligence Officer for the Department and represents the Department on the National Foreign Intelligence Review Board. My responsibilities include the intelligence analysis of international energy technology, economic and political developments and their impact on international energy and non-proliferation policy. The Assistant Secretary for Defense Programs, DOE's alternate Senior Intelligence Officer, is responsible for defense matters.

We currently provide support for developing country energy issues and programs to the Departments of State and Treasury, the Agency for International Development, the Overseas Private Investment Corporation and other U.S. Government organizations. We also serve on an IEA subgroup which is analyzing energy markets in developing countries to assess their impact on world oil markets. International Affairs also serves an international administrative role for the U.S. Government which includes arrangments for the visits of Cabinet and Sub-cabinet level officials from foreign countries.

In summary, International Affairs serves as a liaison with the intelligence community, the rest of the US Government, foreign nations and international organizations, and the oil industry on international energy matters. These functions are important for planning for international oil supply disruptions, nuclear nonproliferation and energy technology oversight purposes.

BUDGET REQUEST FOR FY 1983

(Budget Authority - in Millions of Dollars)

| | FY 1982 | FY 1983 |
|---|---|---|
| International Policy Studies | $ .3 | $ 0 |
| Program Direction | 4.6 | .4 |
| | $4.9 | $.4 |

The history of appropriations for DOE's international function is as follows: FY 1980 - $9.1M; FY 1981 - $8.9 M; FY 1982 - $4.9M. The decline in FY 1982 was caused by the termination of the Country Energy Assessments Program at the end of FY 1981, and by tightened management and realignment of responsibilities to remove redundancies and achieve greater efficiencies and economies. Our FY 1983 request of $400,000 is for severence pay. This request is consistent with the President's plans to assure that international energy functions, including intelligence responsibilities, now tasked in DOE will be appropriately assumed by the Department of Commerce. I want to assure you that the Administration considers the international activities very important and has made preparations for their continuing and thorough handling in the Department of Commerce. In the event the Congress does not enact the proposed reorganization legislation, or it is changed substantially, we will have to reevaluate resource requirements.

### BIOGRAPHICAL SKETCH

Henry E. Thomas was nominated by the President on June 25, 1981, and confirmed by the Senate on October 1, 1981, as Assistant Secretary for International Affairs, U.S. Department of Energy (DOE). In this position, Mr. Thomas is responsible for international energy policy, intelligence developments, and the conduct of bilateral and multilateral international energy relations.

Mr. Thomas served in the policy area with the Environmental Protection Agency since 1973 in senior staff and line management positions. From 1971 to 1973, he served as Assistant Director, Price Commission, Executive Office of the President, where he directed analytical studies of major U.S. industries, including those related to petroleum production and distribution. Previously, he was with Electronic Data Systems Corporation, responsible for governmental liaison and systems studies coordination. He also served with the U.S. Marine Corps, with assignments in the intelligence community and with the Defense Nuclear Agency in materials production, safeguards, and reactor and weapons design.

Mr. Thomas received a B.A. degree in history and economics from Virginia Military Institute in 1959 and an M.A. degree in international affairs from the University of New Mexico in 1970. His graduate work also includes studies in Sino Soviet Affairs at George Washington University, and specialized course work at the Defense Intelligence School, Foreign Service Institute, Military Assistance Institute, the U.S. Atomic Energy Commission, and Defense Nuclear Agency.

Born in Charlotte, North Carolina, Mr. Thomas has resided in Europe, Latin America, and the Far East. He currently lives in Alexandria, Virginia, with his wife, the former Marian Mellish, and their two children, Evans and Nicholas.

### NEED FOR ADDITIONAL BUDGETARY RESOURCES

Chairman HATFIELD. So I understand, without getting into the embarrassing area of statistics, that if the reorganization is not implemented, you will not need additional funding to carry out the presently assigned duties in your Division.

Mr. THOMAS. I would under the circumstances, Mr. Chairman, prefer to respond in the same vein as Mr. Heffelfinger did. Our present resources for fiscal 1982 are very definitely adequate to carry out our responsibilities and, in fact, I would suggest are, perhaps, more than adequate at this time.

We have already effected some very substantial economies in the operation of the Office of International Affairs. Again, as Mr. Heffelfinger indicated, some of our responsibilities are supportive of the Department in nature and, therefore, when other programs have been reduced in scope, content, and particularly the international extent, there has been less of a requirement on the international staff to support those programs.

I might also add parenthetically, Mr. Chairman, that we have taken a significant step in this administration to move some of the international responsibilities that existed in this particular office previously, back to the line programs of the Department, where they have the direct expertise once those programs have been negotiated and put in place. So we have been able to reduce the staffing level of the Office of International Activities almost by half within the last year.

I suspect we can find a few more economies in the nooks and crannies as well, sir.

Chairman HATFIELD. I think I should say thank you. But what I think I heard you say, I am not quite sure.

Mr. Chiles?

## STATEMENT OF MR. J. HUNTER CHILES III, DIRECTOR, OFFICE OF POLICY, PLANNING, AND ANALYSIS

Mr. CHILES. Mr. Chairman, before presenting a summary of the fiscal year budget request for the Office of Policy, Planning, and Analysis, I would like to first provide a brief background on this Office.

### OFFICE OF POLICY, PLANNING, AND ANALYSIS

The Office of Policy, Planning, and Analysis, formerly the Office of Policy and Evaluation, was created pursuant to the mandate of the Department of Energy's Organization Act of 1977 to provide leadership in the development of integrated energy policies and programs and to coordinate a broad range of policy-related functions that cut across organizational lines. The primary responsibilities of the office are to: Improve the analytical framework and data base for energy policy; serve as a principal advisor for formulating, analyzing, and recommending national energy policy; and carry out a systematic evaluation of the Department's programs to insure maximum contribution to the national energy policy.

### RECENT ACCOMPLISHMENTS

The accomplishments of the policy, planning, and analysis staff in the first area include the preparation of many studies and analyses. Recently completed studies include the national energy policy plan, a study of alternatives to the Natural Gas Policy Act, analyses concerning the size and composition of the Strategic Petroleum Reserve and strategies for drawdown, and examination of a range of policy options for dealing with petroleum supply disruptions. In this same vein, my staff currently is working with the Office of Science and Technology Policy on a comprehensive review of the electric utility sector to identify long-term trends and barriers to least-cost electricity futures.

In the area of program evaluation, this office developed and implemented a planning, programing, and budgeting system—PPBS—for the Department of Energy. Most recently, we directed the sunset review of the Department as required by the DOE Organization Act. This review of the effectiveness of all departmental programs was the first of its kind in the Federal Government. Currently, we are directing a program review process that builds on the results of the sunset review and develops 5-year program plans for each element of the Department.

## BUDGET REQUEST

My budget request for fiscal year 1983 reflects both the market-oriented energy policy of this administration and the need for fiscal responsibility. The requested level of funding is $1,660,000, a decrease of $13,056,000, or 89 percent, from the amount appropriated in fiscal year 1982. A statistical table showing the fiscal year 1982 budget appropriation is included in my statement.

The fiscal year 1982 request includes funds for two primary program elements—program direction and policy analysis and systems studies.

## PROGRAM DIRECTION

Program direction provides funding for salaries, benefits, and travel expenses for PPA's in-house staff. Their primary functions are conceptual development and framing of issues and analytical tasks, selection of methods of issue analysis, program evaluation, and policy development.

Our fiscal year 1983 budget request of $1,410,000 for program direction is a reduction of $4,383,000, or 76 percent, from the fiscal year 1982 level. This funding decrease results from the restructuring of the Department.

Of the funding request, $410,000 will provide for the expenses of 10 FTE's that will continue energy policy functions in the Department of Commerce. The remaining $1 million will provide severance pay which is necessary due to staff reductions—from 137 FTE's in fiscal year 1982 to 10 FTE's in fiscal year 1983.

## POLICY ANALYSIS AND SYSTEM STUDIES

Our request of $250,000 for policy analysis and systems studies, those performed under contract, represents a reduction of $8,673,000, or 97 percent, from the amount appropriated for fiscal year 1982.

The proposed decrease in this area reflects the administration's commitment to rely on the American people's individual and collective judgments about the proper mix and amount of each energy source required for this economy, based on free-market principles rather than overt Government directions. This commitment mandates the need for stability in public policy and reduced Government intervention in energy markets.

In line with the administration's priorities, emphasis will be placed on the analysis of future energy policy issues, development of new policy initiatives consistent with the changing role of the Federal Government, and coordination of these initiatives within the appropriate Federal programs.

Mr. Chairman, this concludes my formal presentation. I would be happy to answer any questions you or the members of your subcommittee might have.

Chairman HATFIELD. Thank you very much, Mr. Chiles.

[The statement follows:]

# Statement of J. Hunter Chiles III, Director, Policy, Planning, and Analysis, Department of Energy

I appreciate the opportunity to appear before you today to discuss the FY 1983 budget for the Office of Policy, Planning, and Analysis.

## BACKGROUND

Before presenting a summary of the FY 1983 budget request for Policy, Planning, and Analysis, I would like to first provide a brief background on this Office.

The Office of Policy, Planning, and Analysis (PPA), formerly the Office of Policy and Evaluation, was created pursuant to the mandate of the Department of Energy's Organization Act of 1977, P.L. 95-91, to provide leadership in the development of integrated energy policies and programs and to coordinate a broad range of policy related functions that cut across organizational lines. The primary responsibilities of PPA are to:

- Improve the analytical framework and data base for energy policy;
- Serve as a principal advisor for formulating, analyzing, and recommending national energy policy;
- Carry out a systematic evaluation of the Department's programs to ensure maximum contribution to the National Energy Policy.

## RECENT ACCOMPLISHMENTS

The accomplishments of the PPA staff in the first area include the preparation of many studies and analyses. Recently completed studies include the National Energy Policy Plan, A Study of Alternatives to the Natural Gas Policy Act, analyses concerning the size and composition of the Strategic Petroleum Reserve and strategies for drawdown, and examination of a range of policy options for dealing with petroleum supply disruptions. In this same vein, my staff currently is working with the Office of Science and Technology Policy on a comprehensive review of the electric utility sector to identify long-term trends and barriers to least-cost electricity futures.

In the area of program evaluation, this Office developed and implemented a planning, programming and budgeting system (PPBS) for the Department of Energy. Most recently, we directed the Sunset Review of the Department as required by the DOE Organization Act. This review of the effectiveness of all Departmental programs was the first of its kind in the Federal Government. Currently, we are directing a program review process that builds on the results of the Sunset Review and develops five-year program plans for each element of the Department.

## FY 1983 BUDGET REQUEST

My budget request for FY 1983 reflects both the market-oriented energy policy of this Administration and the need for fiscal responsibility. The requested level of funding is $1,660,000, a decrease of $13,056,000 or 89 percent, from the amount appropriated in FY 1982. A statistical table showing the FY 1982 budget appropriation and the FY 1983 budget request follows:

BUDGET COMPARISONS

(BA in thousands)

| | FY 1982 Appropriation | FY 1983 Request |
|---|---|---|
| Program Direction | $ 5,793 | $ 1,410 |
| Policy Analysis and Systems Studies | 8,923 | 250 |
| Total | $ 14,716 | $ 1,660 |

The FY 1982 request includes funds for two primary program elements--program direction and policy analysis and systems studies.

## PROGRAM DIRECTION

Program Direction provides funding for salaries, benefits, and travel expenses for PPA's in-house staff. Their primary functions are conceptual development and framing of issues and analytical tasks, selection of methods of issue analysis, program evaluation, and policy development.

Our FY 1983 budget request of $1,410,000 for Program Direction is a reduction of $4,383,000 or 76 percent from the FY 1982 level. This funding decrease results from the restructuring of the Department. Of the funding request, $410,000 will provide for the expenses of 10 FTE's that will continue energy policy functions in the Department of Commerce. The remaining $1,000,000 will provide severance pay which is necessary due to staff reductions (from 137 FTE's in FY 1982 to 10 FTE's by the beginning of FY 1983).

## POLICY ANALYSIS AND SYSTEMS STUDIES

Our request of $250,000 for policy analysis and systems studies, those performed under contract, represents a reduction of $8,673,000 or 97 percent from the amount appropriated for FY 1982.

The proposed decrease in this area reflects the Administration's commitment to rely on the American people's individual and collective judgements about the proper mix and amount of each energy source required for this economy, based on free-market principles rather than overt Government directions. This commitment mandates the need for stability in public policy and reduced government intervention in energy markets.

In line with the Administration's priorities, emphasis will be placed on the analysis of future energy policy issues, development of new policy initiatives consistent with the changing role of the Federal Government, and coordination of these initiatives within the appropriate Federal programs.

Mr. Chairman, this concludes my formal presentation. I would be happy to answer any questions you or the members of your subcommittee might have.

## BIOGRAPHICAL SKETCH

J. Hunter Chiles, III was appointed Director, Office of Policy, Planning and Analysis, U.S. Department of Energy (DOE), on June 1, 1981. In this position, Mr. Chiles is responsible for developing national energy policy, coordinating the analysis and evaluation of policies and programs, and conducting a continuing assessment of the Nation's energy situation.

Prior to his current appointment, Mr. Chiles was chief energy policy planner for Westinghouse Electric Corporation at corporate headquarters in Pittsburgh, Pennsylvania. Joining Westinghouse in 1960, he held engineering and management positions of increasing responsibility until his appointment as Director of Strategic Marketing Operations in 1980. As Director, he was responsible for long-range forecasting of energy supply and demand, domestic electricity requirements, and economic trends, as well as corporate support in long-term energy research and development and analytical predictions concerning the business environment and implications for products and services.

Mr. Chiles is a graduate of Virginia Polytechnic Institute with a Bachelor of Electrical Engineering degree. He received a master's degree in business administration from the University of Pittsburgh and his professional engineer's license in 1968. Mr. Chiles' military service was in the U.S. Army as a guided missile staff officer, supervising maintenance of the Army's missile systems.

He is a recognized authority on the subject of energy and is in demand as a speaker nationally and internationally. In addition, Mr. Chiles has testified on energy matters before many government organizations.

Born in Sharon, Pennsylvania, Mr. Chiles currently resides in Fairfax, Virginia. He is married and has two sons.

## STATEMENT OF ROSSLEE G. DOUGLAS, DIRECTOR, OFFICE OF MINORITY ECONOMIC IMPACT

Chairman HATFIELD. Ms. Douglas.

Ms. DOUGLAS. Thank you Mr. Chairman, members of the subcommittee, I am Rosslee G. Douglas, Director, Office of Minority Economic Impact—OMEI. I appreciate the opportunity to appear before you today in support of the budget request for fiscal year 1983 program administration activities.

### OFFICE OF MINORITY ECONOMIC IMPACT

OMEI was established in November 1978, pursuant to section 641 of the National Energy Conservation Policy Act—Public Law 95–619. Its legislative mandate is to advise the Secretary of Energy on the impact of the Department's energy policies, regulations and programs on minorities, and to suggest activities that would insure that minorities and minority businesses are afforded an opportunity to participate fully in the Department of Energy's programs.

OMEI is presently responsible within the Department for a number of ongoing programs, including the minority business loan program, the historically black college program, prefreshman engineering college program, the minority bank development program, and several research programs which involve the investigation of the socioeconomic effects of national energy programs on minorities. The services provided by OMEI are unique because technical assistance is provided not only to minority business enterprises, but to minority educational institutions and minority organizations as well.

I am proud of what OMEI has accomplished during the period of less than 1 year since I have been Director of the Office. These OMEI program activities are in line with the administration's philosophy of self-help. Therefore, they are very important to minorities and the country. Based upon the President's reorganization plan, no separate line item program funds are provided. However, the need for OMEI's functions is recognized.

Assuming that the reorganization of Federal energy responsibilities is accomplished, all the functions included in Public Law 95–619, which created the Office, will be retained, and carried on. The appropriation for 1981 is $3,739,000, and for 1982, $1,995,000.

Mr. Chairman, this concludes my remarks. I would be happy to answer any questions you or the members of your subcommittee might have.

## STATEMENT OF JAMES R. RICHARDS, INSPECTOR GENERAL

Chairman HATFIELD. In between all of these activities is the Inspector General.

Mr. RICHARDS. Yes; on the far right as they say.

I asked Bill Heffelfinger why they always seated me on the far right and he said that is where we think you belong. I didn't press him on the reason.

Chairman HATFIELD. Your full statement will be placed in the record. Would you please highlight and, if there is a vote call, I would like to complete this panel before I go to vote.

### OFFICE OF INSPECTOR GENERAL

Mr. RICHARDS. Let me say that in my statement we are requesting about $7.179 million for fiscal year 1983 for the Inspector General function. In the short time I have been there, I think we have developed a new relationship with the Secretary and top management that is cordial but arms length, that is productive and constructive.

We hope to make this a cost-effective Office as it is designed to be and also to prevent or detect any fraud or corruption and get it to the Department of Justice and bring those who perpetrate those acts to the bar of justice. We think we are well along toward that.

Thank you.

[The statement follows:]

## STATEMENT OF JAMES R. RICHARDS, INSPECTOR GENERAL, DEPARTMENT OF ENERGY

Mr. Chairman, I would like to express my pleasure in having the opportunity to address the members of this Subcommittee. I am James R. Richards, the Inspector General of the Department of Energy (DOE).

### RESPONSIBILITIES

The statutory responsibilities of the IG are to detect and prevent fraud and abuse and to provide policy direction for auditing activities to promote economy and efficiency in the programs and operations of DOE. These responsibilities relate to the work of over 17,000 employees directly employed by the Department, to about 120,000 people working for DOE contractors at Government-owned, contractor-operated facilities, and to the activities of employees of many thousands of other contractors and grantees of the Department.

The Department of Energy is a complex and multi-missioned Department with missions varying from the assembly of nuclear weapons to the funding of energy audits for schools and hospitals. The Department has undergone and will continue to undergo significant changes in emphasis and program funding in the coming fiscal year. These changes may cause major shifts in manpower, resources, and responsibilities. It is during such periods of major change that the Office of Inspector General can be most effective in carrying out its responsibilities. Frequently administrative and internal controls may not be as effective as they are during more stable periods.

### ORGANIZATION

### - Audits, Inspections, Investigations -

The Office is organized in three divisions with three Assistant Inspectors General. The Office of Audits is responsible for conducting the following types of audits: financial and compliance; efficiency and economy; and program results. The Office of Investigations is responsible for the detection and prevention of fraud and abuse. The Office of Inspections is responsible for reviewing DOE's highly complex technical programs and operations. In addition, an Office of Executive Director performs administrative, personnel, policy, planning, and management information functions for the Inspector General.

Within the last several months we have completed the transfer of 46 field auditors, who formerly reported to the operations managers, to the field audit function of the Office. This action had been recommended to the Secretary in a GAO report, and gives us control of all auditors within DOE. Thus, we have doubled the number of auditors assigned to the Office and quadrupled the number of IG auditors assigned to field locations. Accordingly, we have recently reorganized our Office of Audits into three major operational units (Eastern Region, Western Region, and Washington Audit Office) which we expect to greatly enhance the effectiveness of our audit efforts.

## ACCOMPLISHMENTS

Our Calendar Year 1981 Annual Report to the Secretary and the Congress has been submitted to you on March 31, 1982. This report will describe in detail our accomplishments last year. Our audits and inspections have continued to make recommendations that have significant dollar impacts. For example, at our recommendation the Department raised the interest rate on delinquent accounts receivable for an estimated annual savings of $2 million. Further, our investigative efforts have continued to focus on suspected fraud and abuse and these efforts have often resulted in indictments and convictions, as well as administrative actions.

## FUNDING LEVEL

The following is a description of the funding level of the Office for FY 1982 and the budget request for FY 1983:

| | FY 1982<br>Budget | FY 1983<br>Budget Request |
|---|---|---|
| Salaries | $6,053,000 | $6,273,000 |
| Other Compensation | 419,000 | 220,000 |
| Benefits | 597,000 | 604,000 |
| Travel | 413,000 | 55,000 |
| Support/Services | 603,000 | 27,000 |
| | $8,085,000 | $7,179,000 |

The 159 full-time equivalents allocated to us in FY 1982 (152 of which are for full-time permanent employees) will permit us to end this fiscal year with 166 full-time employees. The 159 full-time equivalents allocated to us in FY 1983 (153 of which are full-time permanent employees) will allow us to retain 153 full-time employees.

I appreciate the opportunity to appear today before this Subcommittee and will be pleased to respond to any questions you may have.

## ADDITIONAL PREPARED QUESTIONS FOR THE RECORD

Chairman HATFIELD. Thank you very much.

Mr. Secretary, I appreciate very much you and Ms. Douglas and you gentlemen, for your appearance here today. You have been very helpful and we will be back with probably some questions that will arise as we meditate on this afternoon's session and after we have a discussion with Mr. Stockman to see how many questions we might wisely propound to you with the expectation of some response.

Mr. HEFFELFINGER. Thank you very much; we will be pleased to respond to your questions, Mr. Chairman.

[The questions and answers follow:]

## DEPARTMENTAL ADMINISTRATION

Question: If reorganization is not implemented, do you have sufficient funding as proposed in this budget to carry out program administration activities, particularly activities under the Departmental Administration account?

Answer: If the reorganization is not implemented, we will make every effort to accommodate our workload requirements within the funds and staffing requested in the FY 1983 budget. However, in specific areas we may have to reevaluate our requirements based upon final action taken by Congress on the reorganization of federal energy programs and the FY 1983 budget.

## General Counsel

Question: -- On page 3 of your statement, you mention that there are 423 pending cases under the Emergency Petroleum Allocation Act enforcement program. Please elaborate on the status of this effort.

Answer: We currently have about 365 cases pending in Federal Courts, 170 before the Federal Energy Regulatory Commission and 185 in administrative litigation before the Department's Office of Hearings and Appeals. Additionally, there are about 90 open subpoena enforcement cases that are handled by the local United States Attorneys Office with support from us as necessary.

The great majority of cases before the Office of Hearings and Appeals involve challenges to Proposed Remedial Orders requiring restitution of overcharges determined by the Economic Regulatory Administration. Three-quarters of our FERC cases are challenges to final Remedial Orders requiring restitution of overcharges determined through full administrative proceedings. One quarter of our FERC cases and some of our court cases involve challenges to orders denying exception relief.

By far the largest category of court cases involves oil company challenges to our former pricing regulations, rulings or interpretations or to final Remedial Orders. There also are a small number of enforcement cases that the Department has brought directly in Federal Court.

The aggregate amounts at issue in all of these cases cannot be measured in any meaningful way. Some cases that involve preenforcement challenges to the regulations involve issues that, if decided against the Department, might eliminate any alleged overcharges in the open cases against the major refiners. Cases involving alleged price overcharges range from a few thousand to a few billion dollars. At least three cases each involve alleged overcharges or escrowed disputed "overcharges" in excess of a billion dollars.

The Administrator of ERA believes that, with the exception of the cases involving crude resellers, almost all audits will be completed and these completed cases will either be settled or ready for litigation by the end of September 1982. As the pre-litigation stage of the enforcement effort is concluded, it is possible that litigation workload will increase. This will be true to the extent that ERA is unable to settle cases after audit. ERA currently has a total of 709 cases in the pre-litigation stage; 51 cases involving the major refiners; 417 involving non-majors other than crude resellers; and 241 involving crude resellers.

Question: -- What is the extent of radiation injury claims against the Government. Please provide a status report on these cases.

Answer: Radiation injury claims, both personal injury and property claims, against the government are considerable. There are presently in litigation approximately seventy personal injury actions, many of which are suits involving multiple plaintiffs. For instance, one consolidated case in United States District Court in Utah has over one thousand plaintiffs alleging that over 400 deaths and injuries were caused by atomic testing in Nevada. The cases involve private citizens, military personnel, test site workers and federal employees. There are also suits alleging injuries and death as a result of atomic testing in the Pacific as well as a number of cases involving alleged injuries at DOE contractor facilities through out the country.

Agencies involved in addition to DOE are DOD, its various departments, VA, HHS, NRC, TVA and DOS. The approximate number of individual plaintiffs is 1400 and the amount claimed is about $3 billion. Millions of dollars are being expended in defense of the cases for attorney resources, expert witnesses, research and litigation costs. The cases are in various stages of litigation, including some on appeal. In addition, there are a large number of claims proceeding through various administrative channels under the Federal Tort Claims Act, Veterans Administration, DOL, DOE and DOD. The number of administrative claims pending before DOE alone, including those in litigation, is approximately 2500.

## Workload for Congressional Affairs

Question: Please provide the Committee with the Department's anticipated workload in the legislative area.

Answer: The merger of the Department of Energy and Commerce will produce an energy legislative workload for FY 83 that will include the ongoing contact with the Committees of jurisdiction in Authorization and Apprioriation activities in the following high priority areas of this Administration:

- National emergency planning and the Strategic Petroleum Reserve
- Multi-disciplinary long-term high risk research and development
- Ongoing dissemination of energy information
- Expanded requirements of defense programs' research, development, and production
- The specifically mandated Federal programs such as nuclear waste disposal

In addition, we will continue to respond to ongoing constituent requests for information, employment, and local contractor and Federal activity impacts and interests.

## Federal Actions for the Territories

Question: Are any Federal actions proposed as a result of the comprehensive energy plans for the territories and Puerto Rico?

Answer: There will not be any Federal actions proposed as a result of the completion of comprehensive energy plans for the U.S. territories and the Commonwealth of Puerto Rico. These plans will focus on the near term, utilizing the most commercially viable technologies in conjunction with private sector initiatives and local government direction.

## Funding for International Affairs

Question: On page 7 of your prepared statement, you indicate that "in the event the Congress does not enact the proposed reorganization legislation, or it is changed substantially, we will have to reevaluate resource requirements." If legislation is not enacted, will you need additional funding? Please describe in detail.

Answer: The Office of International Affairs does not have estimates based on a non-reorganization assumption. If the reorganization is not approved or is changed substantially, we will have to reevaluate our requirements in line with the final action taken regarding reorganization of federal energy programs and the FY 1983 budget.

Question: If the Office of Minority Economic Impact were to continue to operate as a separate Office concerned solely with energy issues as they relate to minorities, how much funding and what personnel would be required in FY 1983?

Answer: The minimum level of funding required to operate the Office of Minority Economic Impact in its current status as a separate Office within the mandate of Public Law 95-619 has not been determined, since the budget proposed assumes reorganization. However, the FY 82 funding indicated in the testimony is a minimum for the Office in its current status.

Question: Since you have testified that the FY budget is based on reorganization of the Department of Energy, what plans have been made to assure continuity of the programs you described in the Office of Minority Economic Impact should the proposed reorganization be rejected by Congress.

Answer: In the event that the proposed reorganization is not approved by the Congress, continuity of the Office of Minority Economic Impact's program activities is assured by the fact that we are proceeding "full steam ahead" with our fiscal year 1982 program activities, and have done some anticipatory planning for fiscal year 1983. We are ready, willing, and able to continue our program activities without any let-up.

## SUBCOMMITTEE RECESS

Chairman HATFIELD. The subcommittee will recess and reconvene at 10 a.m.

[Whereupon, at 3:35 p.m. Wednesday, April 14, the subcommittee was recessed, to reconvene at 10 a.m. Thursday, April 15.]

# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 1983

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THURSDAY, APRIL 15, 1982

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
*Washington, D.C.*

The subcommittee met at 10 a.m. in room 1223, Everett McKinley Dirksen Senate Office Building, Hon. Mark O. Hatfield (chairman) presiding.

Present: Senators Hatfield and Mattingly.

## DEPARTMENT OF ENERGY

### SOLAR, CONSERVATION, AND RENEWABLE ENERGY PROGRAMS

### STATEMENT OF JOSEPH J. TRIBBLE, ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY

ACCOMPANIED BY:
- ROBERT L. SAN MARTIN, DEPUTY ASSISTANT SECRETARY FOR RENEWABLE ENERGY
- MAXINE SAVITZ, DEPUTY ASSISTANT SECRETARY FOR CONSERVATION
- JAMES G. STEARNS, DIRECTOR, OFFICE OF ALCOHOL FUELS

### INTRODUCTION OF ASSOCIATES

Chairman HATFIELD. The hearing will come to order.

Today, we continue our hearings on the Department of Energy budget for 1983. The purpose of this hearing is to receive testimony from the Department on the so-called renewable energy programs within the subcommittee's jursidiction.

As our principal witness we welcome Joseph J. Tribble, Assistant Secretary for Conservation and Renewable Energy.

Secretary Tribble, we are delighted to have your testimony. You may summarize it as you wish, but before you do, would you introduce your colleagues who are accompanying you today.

Mr. TRIBBLE. Yes. Thank you, Mr. Chairman. We appreciate the opportunity to be here today.

On my second left is Mr. James Stearns, who is Director of the Office of Alcohol Fuels; on my left is Dr. Maxine Savitz, Deputy Assistant Secretary for Conservation; and on my right, Dr. Robert San Martin, Deputy Assistant Secretary for Renewable Energy.

Chairman HATFIELD. We welcome each of you.

Mr. TRIBBLE. I would like to give a very brief summary of the testimony that is presented for the record.

[The statement follows:]

## STATEMENT OF JOSEPH J. TRIBBLE, ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY

I appreciate this opportunity to appear before you today to discuss the budget request for the Department's renewable energy programs. The budget before you today reflects this Administration's commitment to the goals of the Economic Recovery Program, the need to minimize Government intervention in the marketplace, and the need to continue Federal support for research in areas where support is appropriate.

In testimony before various Authorization Committees this year, the Congress has expressed a general dissatisfaction with the amount of reduction in proposed expenditures for FY 1983 as compared to FY 1982. Indeed, some persons have stated that we will undoubtedly have more money appropriated than we have requested. The Appropriation's Committees, of course, will make that determination.

There are rational reasons for the substantial reduction which we will attempt to explain. In this testimony we have also made an effort to explain in some detail what we would expect to accomplish with the level of funding requested.

Much of the money that this Committee has appropriated in prior years has been spent on expensive hardware. We have in the past built extensive demonstrations of parabolic troughs, parabolic dishes, solar thermal central receivers, wind machines, biomass gasifiers, geothermal power plants, flat plate collectors, and buildings embodying active and passive solar technologies. Many of these demonstrations have served their purpose, and should now be disposed of. Others are in the data collecting stage. It is our intent to gather an optimum amount of useful data from these installations and package that information in a form that will be useful to anyone who has need for it. In many cases this data collecting and reporting phase will be completed with FY 1982 funding. In many instances, these renewable technologies have been advanced to the point where the private sector can implement their use when it is economical to do so. We see no reason to build additional expensive hardware installations. We do feel that there is considerable additional research that is a proper government role. It is for this work that funding is requested, bearing in mind that every dollar we spend we must borrow at the current high rate of interest.

By way of overview, the FY 1983 budget for solar and other programs in the Energy Supply Research and Development account totals $82.0 million. The accompanying table summarizes the funds available for each technology for 1983.

I would now like to turn to technology highlights for each solar and other renewable technology program contained in our FY 1983 budget request, provide a brief status report, and discuss proposed work for 1983.

## PHOTOVOLTAIC ENERGY TECHNOLOGY

There has been substantial progress in photovoltaic technology and industry development over the past several years in both single crystal and polycrystalline silicon and other noncrystalline materials. For single crystal silicon, the efficiency of commercial cells and arrays has been increased from about 7 to 14 percent, the operational and lifetime reliabilities improved by about ten-fold and, at the same time, the cost of arrays reduced by a factor of about five. The number of photovoltaic array producers has increased from a few specialty companies, using expensive manual production processes for space applications, to more than 15, many of which use semi-automated pilot production lines to serve the growing market. Industrial sales have increased from a few kilowatts in 1975 to an estimated 5 megawatts of peak capacity in 1981, which amounts to systems sales of about $75 million. Over this same period, industry has invested substantially in research and development, production facilities and marketing. Industry invested an estimated $100 million for such purposes in 1981. The Atlantic Richfield Co. and Southern California Edison Co. have recently announced that Arco Solar will build a one megawatt photovoltaic electric generating facility and furnish energy to the utility.

The Solarex Company has under construction two plants for the manufacture and assembly of polycrystalline photovoltaic cells.

### FY 1983
### Renewable Energy R&D
### Energy Supply Research and Development Appropriations
### (B/A in thousands)

| | FY 1983 Requested Budget |
|---|---|
| Solar Energy | |
| Photovoltaics | 27,035 |
| Solar Thermal | 18,025 |
| Biomass | 6,605 |
| Wind Energy | 5,485 |
| Solar International | 9,500 |
| Alcohol Fuels | 2,940 |
| Program Support | 500 |
| Program Direction | 2,146 |
| Total | 72,236 |
| Geothermal | |
| Geopressured Resources | 2,440 |
| Geothermal Technical Development | 6,970 |
| Program Direction | 400 |
| Total | 9,810 |
| Geothermal Resource Development Fund | |
| Program Direction | 75 |
| Total | 75 |
| GRAND TOTAL RENEWABLE ENERGY R&D | 82,121 |

In addition to the component, module and subsystem manufacturers, there are a large number of companies providing information, engineering, design, installation, maintenance and other services to photovoltaic system users and potential users.

Progress has also been made in conversion efficiencies of thin film techniques such as amorphous silicon, polycrystalline silicon, single crystal gallium arsenide, and copper sulfide/cadmium sulfide. The efficiency of multibandgap advanced concentrator cells has also been experimentally advanced.

For FY 1983, the Department is requesting $27.035 million to continue long-range photovoltaic research that will allow the private sector to address increased efficiency, potential cost reduction and reliability improvements. The proposed FY 1983 program will emphasize materials research activities to expand the scientific data base for the design of stable, high photon-to-electrical conversion efficiency photovoltaic cells. Research will be conducted on understanding causes and effects of defects in cells. Research on amorphous materials will be conducted on various deposition techniques, to understand the fundamental properties of amorphous materials and to examine interfaces between dissimilar amorphous materials. Research on thin-film polycrystalline materials will examine the physical phenomena of electrochemical deposition techniques for improved cells. Work will also be conducted on multibandgap materials, on new materials for very high efficiency cells, on fluorescing materials for luminescent concentrator devices and on photoelectrochemical cells.

A second area of emphasis is on supporting research and measurements. This will provide improved techniques for measuring material and device properties, including development of a methodology and interpretation technique for accelerated lifetime testing. Measurement techniques will be developed to understand the stability of thin-film compounds and amorphous materials and to identify primary degradation mechanisms. Models to predict output characteristics of concentrator array subsystems will be developed and accelerated life-test models for silicon modules will be validated. Also, research on improved methods of examining semi-conductor, metal and insulator surfaces will be conducted.

Finally, research on advanced concepts will be considered to explore entirely new state-of-the-art approaches for very high efficiency photovoltaic conversion devices. Work will include analysis of layer thickness, concentration gradients and contact metallurgy for improved cells and exploration of novel concepts for cascade cell interconnections.

## SOLAR THERMAL TECHNOLOGY

The Solar Thermal Technology Program is composed of two major activities: the Research and Technology Development Activity involves research on materials, and thermochemical and thermodynamic processes; the Systems and Test Evaluation Activity evaluates the technical feasibility of first-of-a-kind solar thermal systems.

Significant advances have been realized in two major concentrating collector types: parabolic trough and central receiver systems. The Parabolic trough concentrator efficiency has been improved while simultaneously reducing concentrator structural complexity. For central receivers, heliostat designs and materials which reduced projected costs from those of the first generation designs by 80% have been developed. U.S. industry is the world's leader in solar thermal technology.

Accomplishments anticipated in FY 1982 in the Solar Thermal Technology Program include the start-up at Barstow of the 10 MWe Central Receiver Pilot Plant; start-up at Shenandoah, Georgia, of the parabolic dish total energy system; and validation of the technical feasibility and economic potential of parabolic troughs for generating solar industrial process heat. Several commercial deployments of solar thermal technology, particularly parabolic troughs, are either committed or under serious negotiation within the private sector.

The FY 1983 budget request is for $18.0 million.

The Department requests $8.1 million for Research and Technology Development to support research stressing thermosciences and materials. Included will be research on optical coating of polymeric materials, methods of minimizing degradation of reflective surfaces due to environmental factors such as ultraviolet effects, analysis of high temperature ceramic receivers and optical windows, high temperature absorbers for thermal storage, and the identification and evaluation of solar thermal and photon driven processes for fuels and chemical production.

The request for Systems Test Evaluation is $9.5 million to complete Federally supported operation of the 10 MWe Central Receiver Pilot Plant at Barstow, California. Successful automated operation of this system in a grid connected application will validate the technical feasibility of central receiver technology for bulk electric power generation.

The capital equipment funding request of $0.4 million will support acquisitions required for materials research.

## BIOMASS

A number of biomass technologies are currently competitive in the marketplace. These include direct combustion systems for the production of process steam/heat and electricity or for cogeneration, low-Btu gasification systems, and anaerobic digestion systems for the production of medium-Btu gas. The economics of producing biomass energy is becoming even more attractive to private industry as the deregulation of natural gas prices occurs and further basic technology advancements are achieved.

Current biomass feedstock production research activities include investigations of aquatic, woody biomass and herbaceous energy resources. Laboratory investigations are being performed to reduce the risks associated with the production of microalgal oils that can be used for energy applications. Research is also being done on the biochemical mechanisms controlling hydrocarbon production by macroalgal species. Herbaceous energy research and development, which includes experiments on marginal and arid lands, is being completed in fiscal year 1982.

In thermochemical conversion, evaluations of a variety of high performance gasification systems for producing medium-Btu gas and synthesis gas will be concluded in FY 1982, and further development can be left to private industry. Progress is being made toward understanding the basic mechanisms and kinetics affecting the thermochemical processing of biomass through fast pyrolysis and direct liquefaction techniques.

In biochemical conversion, fundamental research is being performed on anaerobic digestion processes. Research activities also include laboratory-scale experiments on photobiological methods for hydrogen production.

The FY 1983 Biomass research program will continue to address basic biomass technology research needs. The FY 1983 budget request is for $6.6 million. The budget will allocate $1.5 million for aquatic systems research and development, $2.0 million for thermochemical conversion research and development, $2.1 million for biochemical conversion research and development and $1 million for biological hydrogen production research activities.

Planned feedstock production research activities will focus on the development of microalgal cultivation systems. Basic research in fast pyrolysis, liquefaction and gasification of biomass feedstocks will continue. Bioconversion program activities will support research that will enable a better understanding of the digestion of crop residues and other low-quality materials. Biochemical conversion research and development will also focus on fundamental research on the microbiology and biochemistry of digestion cultures in addition to genetic manipulation of methane producing organisms for enhanced yields and efficiencies. Exploratory research in the biological hydrogen program will focus on areas which will contribute to increased hydrogen production efficiencies. Advancements in this program should enable the private sector to develop efficient photobiological processes for producing hydrogen from water and biomass resources.

## WIND ENERGY TECHNOLOGY

Both wind energy technology and the wind industry have progressed substantially in the past few years. There are now some 40 companies involved in the development of small wind systems, compared to 7 in the mid-1970's, and about 20 are producing and selling commercial machines. A distribution network is also forming. Approximately 15 intermediate and large scale wind turbines from about a half dozen manufacturers are now under construction or in the testing stage, mostly in utility power generation applications. Some of these systems have been developed without direct Federal support. Several utilities have purchased wind turbines for prototype evaluation experiments, and a few private firms are planning and initiating wind farms to produce electricity for sale to utilities.

DOE programs to develop advanced small systems are essentially complete. Testing of the 1, 4, 8, 15 and 40 kilowatt prototype systems at the Rocky Flats Test Center in Colorado will be completed this year. In a number of cases, positive results of the developmental efforts have been incorporated into manufacturers' prototypes as design improvements to their currently available systems.

A major thrust of the FY 1982 Wind program is to complete the pre-design of the MOD-5 large wind energy system which will have a peak power rating in excess of 6 megawatts. The completion of this phase will increase the capability of the private sector to pursue further development of cost competitive wind energy systems for utility applications. Federal support for other intermediate to large wind energy system projects will also be concluded in FY 1982 and the facilities may be offered to the host utilities for continued operation pursuant to appropriate Departmental regulations. The four 200 kilowatt MOD-OA systems have provided useful data in over 33,000 total hours of operation. Testing on the 2 megawatt MOD-1 experimental large-scale wind machine at Boone, North

Carolina, is completed. Operation of the three 2.5 megawatt MOD-2 wind turbines at Goodnoe Hills, Washington has established technical feasibility of a three-unit cluster on a utility grid.

Significant advancements in vertical-axis (Darrieus) technology have also been made and verified. The three prototype 17 meter, 100 kilowatt Darrieus systems that are currently undergoing operational tests have substantiated that power production levels can be achieved approximately equal to two-thirds of the theoretical limits of a perfect turbine. The data also suggest that operation and maintenance costs may be lower than comparable horizontal-axis machines. At least two U.S. firms are considering manufacturing the DOE prototype 100 kilowatt Darrieus for commercial sale.

The FY 1983 budget requests $5.4 million for operating funds and $0.1 million for capital equipment. The technical challenge of the FY 1983 program will be to develop methods that will enable machine designers to account more accurately for stresses and fatigue life associated with aerodynamic and structural dynamic loads in wind turbines. These design considerations are important because advancements in machine safety and lifetime, as well as economics and performance, depend upon these factors. In turn, the structural stresses and fatigue life of wind turbines depend upon four related factors: wind velocity, airfoil and blade shape, vibrations, and durability. These four factors form the basis for the key activities that support the main research thrust of the FY 1983 wind program.

Research will be continued on improved analytical techniques and models for predicting aerodynamics, structural dynamics and energy output performance of wind energy systems. These improved analytical models will be available to machine designers and will also be used in Departmental research on methods to define more precisely the loading and fatigue levels of structural members.

To develop a better understanding of the effects of transient wind conditions on turbine performance and structures, research will continue on further refinement of atmospheric fluid dynamics models to enable the prediction of the effects of short-term wind variability and small scale wind velocity variations on the performance and structural loads on a single turbine and an array. Airfoils, and lift augmentation devices with high lift to drag ratios, will be investigated. The aerodynamic self-feathering and stall phenomena as applied to movable rotor tips will be studied. Computer models for generic structural analysis will be validated using test data from existing experimental systems. Material property data for fiberglass/resin and other composites will be developed and test samples will undergo accelerated lifetime testing. Also, the 5-meter and 17-meter experimental Darrieus machines will be operated to develop and validate models that predict vertical axis wind turbine performance.

## SOLAR INTERNATIONAL PROGRAM (SOLERAS)

The SOLERAS Program is a five-year, $100 million jointly funded solar energy research and development cooperative agreement between the United States and Saudi Arabia, which was signed in October 1977. The prime purpose of the Agreement is to advance the state-of-the-art of solar energy. The program covers a diverse set of solar technologies and applications, allowing participation by a large group of industrial, academic and research institutions in both countries.

Major FY 1982 accomplishments by SOLERAS include completion of the Solar Cooling Field Test facilities in the southwest U.S. and a Photovoltaic Village Power System in Saudi Arabia. Additionally, work is continuing on solar cooling research, solar powered desalination, and controlled environment agricultural systems.

The FY 1983 budget request item of $9.5 million would complete the United States bilateral commitment for work under SOLERAS.

## ALCOHOL FUELS

The Alcohol Fuels Research program has focused on the need to develop technologies for producing ethanol and methanol from a variety of feedstocks. As part of this effort, we successfully completed steam explosion tests which reveal that steam explosion is a technically feasible pretreatment process for lignocellulosic materials. During the year we have isolated a yeast strain which produces alcohol at twice the rate of standard commercial yeast strains and another which is capable of withstanding increased ethanol concentrations. We have also isolated an organism capable of fermenting pentose sugars to ethanol, which have significant potential for increasing the yield of ethanol from ligonocellulosic materials.

We are not requesting any additional funds in FY 1983 for feasibility studies, cooperative agreements or loan guarantees since a total of $271 million is already available for alcohol fuel loan guarantees authorized by the Energy Security Act. Negotiations with 10 companies for loan guarantees are continuing. These negotiations, if successful, will facilitate the construction of plants with an annual capacity of 350 million gallons of anhydrous ethanol.

The FY 1983 budget request is for $2.9 million. During FY 1983, R&D initiated in earlier years will be brought to an orderly conclusion because this program consists primarily of activities that, over time, can be pursued by the private sector in response to market forces. Approximately $0.6 million will be used for methanol R&D, including gasification and catalysis. The remainder will be used for ethanol R&D, focusing on hydrolysis processes for lignocellulosic material. In FY 1983, R&D activities in acid hydrolysis will be completed. In the area of enzymatic hydrolysis we will conclude research to screen and select microorganisms to increase enzyme concentrations and thermal stability and to reduce their sensitivity to alcohol. We will complete characterization and development of organisms capable of both hydrolyzing and fermenting either cellulose or hemicellulose to ethanol.

The final area of alcohol R&D includes activities designed to produce fuels from by-product streams. This R&D, including developing technologies to produce butanediol and methylethyl ketone from xylose, will also be phased out during FY 1983.

## GEOTHERMAL

The three principal types of geothermal resources, in order of their anticipated technological readiness, are hydrothermal reservoirs (hot water and steam), hot geopressured brine containing dissolved methane, and hot dry rock.

The DOE R&D activities have significantly reduced the risk involved in finding reliable, safe and environmentally acceptable hydrothermal resources, and reduced the cost uncertainty of their use for production of both electric power and direct heat. Hydrothermal resources have been identified in 37 states, and industry is moving rapidly to exploit them. It is anticipated that the U.S. hydrothermal electric power capacity will exceed 3000 megawatts by 1985, and over 200 direct-use developments are currently in operation in 16 different states. In FY 1982 we are continuing to support the critical long-term research in energy conversion, geochemical engineering and materials, and geoscience technology. We are bringing to an orderly conclusion our programs for near-term development drilling and completion, stimulation and environmental control technology, where commercial capabilities already exist. We are also completing our Geothermal Resource Development Fund activities.

Uncertainties about the size, characteristics, and potential use of the very large geopressured and hot dry resources have been reduced. In fiscal year 1982 we are continuing these programs to provide additional data on the technical and economic viability of these resources.

The FY 1983 budget request is for $9.8 million. The budget will allocate $4.5 million for hydrothermal technology, $2.4 million for geopressure resource definition, and $2.5 million for hot dry rock technology, with $0.4 million for program direction.

We plan to continue long-term high risk hydrothermal research including continued development of direct-contact binary conversion technology and research on the properties of fluids for binary systems. In geochemical engineering and materials, we will continue development of high-temperature and corrosion-resistant materials, and technologies for scale control and slurry elimination. We will continue the development and field testing of geoscience technologies to remove technical barriers and broaden the technology base for energy recovery from liquid-dominated reservoirs. We seek to expand our understanding of the physics of reservoirs which depend on natural fractures for fluid circulation as well as the optimum technologies for their utilization. A variety of geophysical and geochemical techniques will be used to characterize reservoirs and improve their performance. In addition we will continue our support of reservoir injection technologies for reservoir management and surface aquifer protection.

In the geopressured program we plan to complete the testing of four wells designed and drilled especially to evaluate geopressured reservoir performance under production conditions.

In the hot dry rock program we will complete the experimental work at Fenton Hill, NM.

## ENERGY STORAGE

A number of projects have been funded under the Energy Storage Program in the past. However, in keeping with Administration policy, many of these projects that have reached technical feasibility are being turned over to the private sector. For example, EPRI has agreed to operate the DOE Compressed Air Energy Storage field experiment at Pittsfield, Illinois in FY 1983. The Department is requesting approximately $7.2 million under the Energy Conservation Research budget submission to carry out basic research on electrochemistry and related areas of scientific inquiry that can provide a generic technology base for energy storage subsystems.

## CONCLUDING REMARKS

The proposed fiscal year 1983 Department of Energy budget for technologies subject to your jurisdiction reflects a completion of the transition begun within the FY 1981 budget. The budget proposed for these technologies focuses upon areas of genuine long-term high risk research beyond the current reach of industrial resources and represents a sizeable commitment to the development of advanced energy concepts.

A transition of a different sort will be completed as industry begins to take advantage of the various incentives; such as R&D tax credits, Accelerated Depreciation Allowances, and Building Rehabilitation Tax Credits; provided by the Economic Recovery Tax Act of 1981.

Mr. Chairman, this concludes my formal statement. I would be pleased to respond to any questions that either you or the other members of the subcommittee may have regarding the Departments FY 1983 budget for solar and other renewable technologies.

### RENEWABLE ENERGY DEMONSTRATIONS

Mr. TRIBBLE. As you probably know, in testimony before various authorization committees this year, the expression has been that there is a considerable dissatisfaction with the amount of reduction in proposed expenditures for fiscal 1983 as compared to fiscal 1982.

These same persons have stated that we will undoubtedly have more money appropriated than we have requested. There are rational reasons for this substantial reduction and we will attempt to explain those in the testimony that is presented. We have made an effort to explain in some detail what we would expect to accomplish with the level of funding that is requested.

One of the reasons that we feel that we can legitimately reduce the amount of request this year is that in the past, much of the money that has been appropriated has been spent on expensive hardware. Last year, it is my understanding that a graphic presentation was made of a number of the facilities that have been built, such as the parabolic troughs, parabolic dishes, and the solar thermal central receiver.

Incidentally, the Barstow operation is in the startup phase. It has now provided electricity for the grid. We have also accomplished the same thing with the wind machines at Goodnoe Hills.

We have also had substantial expenditures in geothermal plants, flat plate collectors, and other activities in the renewable area.

Many of these demonstrations have already served their purpose and we should now dispose of them. On the other hand, many are in the data-collecting stage, and it is our intent to go forward with this and gather an optimum amount of useful data from these installations and package that information in a form that will be useful to anyone who needs it.

In many instances, these technologies have been advanced to the point where they can be implemented by the private sector when they are economical, depending on the price and cost of alternate fuels.

So, we are concentrating now on research rather than on building additional hardware and demonstration facilities. It is in that vein that the proposed budget has been so substantially reduced. With that summary, we will be pleased to attempt to respond to your questions.

### ORGANIZATION OF SOLAR R. & D.

Chairman HATFIELD. Thank you very much, Mr. Secretary. Any other comments?

Let me interrupt a moment and yield to Senator Mattingly so he can get on to other meetings.

Senator MATTINGLY. The world is full of other meetings.

The Secretary and I have known each other for many years. It is difficult for us to call each other Senator and Secretary. We have been Joe and Mac for many, many years.

But prior to my statement, I would like to say it is good to see you again.

Mr. TRIBBLE. Thank you.

Senator MATTINGLY. I think we saw each other when we were civilians more.

Mr. TRIBBLE. That is right.

Senator MATTINGLY. One comment that I do have, and I would like later your response to in writing or however you would like to do it. I would like to tell you what my intent is, because I think in the area of a national energy strategy, I think it still continues today. We lack one that is forecasted 200 or 300 years from now, exactly what we will be relying on.

## POTENTIAL OF RENEWABLE ENERGY AGENCY

I am sure those in this room don't know what we will be relying on at that time. But backing up from that area, if we looked at that, solar does and can produce, and my interest in this area—and I am not prepared to give you anything detailed today—is that I intend to pursue this fiscal year to take money from the nuclear area and move it over in some type of a nonregulatory, similar to a NASA-type agency into a solar-type agency. I would like to have your feel right now about what you would think about that?

Mr. TRIBBLE. The basic technologies, as you know, are generally in place. There is yet a great deal to be done in all of these technologies, and if we may just simply take photovoltaics as an example, and I am no expert on photovoltaics, but the present efficiency of conversion of photovoltaic modules is on the order of 12 percent. If that can be substantially improved, this not only will reduce the cost, but give us an opportunity to gather a great deal more power and energy from the Sun through photovoltaic conversion.

There is a finite limit to the amount of energy that we can derive from wind machines. We have a fairly extensive characterization of the wind conditions throughout the United States on something like an 18-mile grid so that we know generally what is available, and we have had estimates that there are on the order of 1.7 quads of energy available from wind if it is fairly fully developed.

This doesn't mean to have windmills in every location where they will work, but mainly in those instances where there has been a proven resource that would be worth tapping.

## SOLAR AGENCY

Senator MATTINGLY. I would like to get a hard commitment from you. But don't you think it would be worthwhile for this country to develop some type of solar-type agency similar to a NASA-type agency that would be nonregulatory, that would accelerate the program?

Mr. TRIBBLE. Is your thought that funds would go into the operation of this agency?

Senator MATTINGLY. Right.

Mr. TRIBBLE. For this type of research program?

Senator MATTINGLY. Right.

Mr. TRIBBLE. Yes. Let me say this: You are, of course, familiar with the Solar Energy Research Institute. It has had a substantial transition in the last year. It is now much more of a research facility than it was a year ago. This and the other labs that we are working through certainly provide the basis of the kind of thing that you have in mind. So it certainly is a thing that we can work on, and with the objective of obtaining from renewable energies all that we can do economically over time. This would be a very desirable thing to do.

Senator MATTINGLY. I will do this in my normal fiscally conservative manner so it won't cost any money, because, hopefully, my chairman here will also go along with me that we will move that money from the nuclear area—a lateral move with the funds. But with that, I would like to rest right there.

I appreciate seeing you again. You will hear more from us on the subject. Thank you.

Thank you Mr. Chairman.

### ENERGY TAX CREDITS

Chairman HATFIELD. Mr. Secretary, the material that we received from your agency repeatedly refers to the fact that tax credits will assist the private sector in developing solar products and, therefore, reduce the need for Federal involvement and Federal spending. On the other hand, the President has proposed the elimination of the tax credits. Would you care to comment on what appears to be an inconsistency here in policy?

Mr. TRIBBLE. I think the tax credits have had an effect in the past. I know from having been in industry that that is one other factor that is always considered in determining the ROI of any investment, whether it is in energy investment or whatever, and quite likely some energy associated projects have met the hurdle by virtue of the tax credits.

And we would be seeing the result of that, I think, in the next year or so. However, in the 1981 tax bill, as you know, there were a number of provisions that would encourage industry to go forward with installations such as the accelerated depreciation which should certainly offset a large amount of the incentive that was provided through the business energy tax credits.

Chairman HATFIELD. As a substitute.

Mr. TRIBBLE. Yes; that is right.

### ACCELERATED DEPRECIATION

Chairman HATFIELD. But we made that retroactive to January 1. What movement or what evidence do you have that there has been any advantage or any action taken on the basis of that investment tax credit or accelerated depreciation?

Mr. TRIBBLE. It is difficult for us to have any numbers on that, because, as you know, before a corporation can make an expenditure of any sizable amount they have to let it come up from the operating part of the business and go through the financial hurdles and be approved by the board of directors, and then there is substantial time involved in installation. So that I feel that it is too early to see a tangible effect of that.

Chairman HATFIELD. But do you know of any plans? We made it retroactive to January 1, then we added the accelerated or the improved capital gains as of June 1, 1981. That is calendar 1981. We are now about 15 months with the accelerated depreciation. Have you seen or know of any proposals that are taking advantage of this?

I have seen no movement, frankly, when I ask the question in other areas besides the solar question or energy question, where the industry, the corporate structure of this country, has taken on that new proposal and made use of it.

Mr. TRIBBLE. To be very honest, I have not made a great effort to get that kind of information. I am under the impression that the proposal recently made by ARCO Solar to provide energy to Southern California Edison is one example of this that I have, it has simply come to my attention although we have not made any effort to identify those things.

Chairman HATFIELD. As you know, the industry itself has made a very strong proposal or statement to the effect that they would like to see this tax credit extended to 1995 at a level of 15 percent. Do you have any reaction to that?

Mr. TRIBBLE. I think if I were in the industry, I would like to see that too. [Laughter.]

I think that is nothing more than normal. I think that is true; any time you mention a tax credit for assistance in installations of equipment you are going to get a great deal of support, particularly from that industry. And I dare say that come 1995, they would like to have it extended another 10 years.

Chairman HATFIELD. I agree that there is a parochial, vested interest, I am sure, in the industry. But what I am really trying to find out is if there is any—we know that the administration is trying to get government out of a lot of these projects and programs and I applaud the administration for that. I think the administration is on the right track.

But, at the same time, I don't think that you are going to wean off the Federal subsidy and Federal grants and other special interest programs that have been established now for almost 50 years. You are not going to do that overnight, and so you have to almost restructure the whole thinking process of individuals, communities, corporations, whatever they may be, farmers away from this idea of subsidy and get back to the free market forces and really be what built this country.

Senator MATTINGLY. You speak my language.

But going on to something the chairman said in reference to the accelerated depreciation, some of those things didn't go into effect until last summer although they are retroactive. So they had possibly 8 months to put some of those into effect. I think whether they are embryonic industries or not, you might agree that it would probably be, that if we know the high taxes are not going to stimulate any industry but rather it is the low tax structure that will in fact encourage those people and I think that is the corollary. I think we continue to press forward on that.

Chairman HATFIELD. I do feel that with this new direction the administration is trying to move us, that incentives have to be at least a transitional step, such as tax credits, to get them off the Government, out of the Government trough.

### TRANSITION TO PRIVATE SECTOR

Mr. TRIBBLE. A lot of things are taking place that are different. For example, by virtue of the fact that a large number of people are interested in doing the conservation work on their residences and buildings, we are seeing companies spring up who will go and do this work.

Chairman HATFIELD. Pacific Power & Light Co., Portland General Electric pioneered it.

Mr. TRIBBLE. Yes. We are now seeing small local companies that will do this work and, in some instances, they will make the investment and take as their return a part of the savings that are effected. This concept has a number of good aspects to it in my judgment because they are not going to put in equipment that is not cost effective. They assume the responsibility of maintaining it because if they do not effect savings, their return does not grow.

So this is, you might say, an embryonic industry that is beginning to take place. In some of the other technologies I have recently been told of a letter of intent whereby a company and a utility have gotten together for the company to supply the utility with $200 million worth of wind machines. In another one there has been a very recent announcement of a 12-megawatt solar thermal plant to deliver energy to a utility. And then, of course, we have had the announcement by ARCO to develop the 1-megawatt array and sell energy to the utility.

So these are going forward and they may very well be a result of the accelerated depreciation that is available. I do not have information of this nature personally, because I don't know what the financing arrangements have been. But it would lead me to believe that there is adequate incentive for this kind of work to go forward under the present structure.

### SEIA PROPOSAL

Chairman HATFIELD. Let me go back a moment to the issue we were talking about.

Last July, I am informed that SEIA did make or draw some conclusions from discussions with you on a question of the transition of the contract that they proposed—I think probably around $750,000—to move these programs into the private sector, getting the Government out of the solar activities on the basis that you recognize the necessity of having a transition from one umbrella to another.

I understand now from this group that they have become increasingly anxious about getting some kind of a decision or a feeling that they have that there is not a commitment to working with them unless there is a change or something. They don't feel like they are receiving any encouragement—put it that way—as to contracts for this transition.

If you are interested in moving these things into the private sector, do you not agree that there has to be some kind of a blueprint, some kind of a plan, some kind of a schedule that recognizes the transitional requirements for the private sector to assume these responsibilities? Would you care to comment on that observation?

Mr. TRIBBLE. Yes. When we talked I was new man on the block. And I guess I was naive enough to think that we were talking about working together without any monetary exchange. And then I really found out later that they were talking about doing this for a substantial contract.

Chairman HATFIELD. You thought there was such a thing as a free lunch? [Laughter.]

Mr. TRIBBLE. No. I realize that is not the case. But I thought that they were interested in making this transition, and I am sure they are. But I guess I interpreted the discussion as one of, "Let's work together and make this transition." And I was certainly interested in doing so.

Chairman HATFIELD. What if we provided the money for this transitional program, Secretary Tribble? Would that relieve you then of the problem you have?

Mr. TRIBBLE. It is not that kind of a problem. I think that we probably could, somewhere in the appropriations that we have, find the money for it. But I first think that a cooperative effort can be helpful, not only working with SEIA, but other organizations that are interested also. And I am concerned that we should feel that we would have to go to this kind of a contract to effect that transition.

I think it is in the interest of all of the segments of the industry to take over and make money from these renewable sources. It is in our interest to turn it over to them and I believe we know how to do so. And I just, very honestly, don't feel the need to go to another group and have them tell us how it should be done.

I have to reinforce that by saying that their presentation on what they think the solar and renewable budget should be for fiscal 1983 is quite different from what we think it should be.

And so I wonder if the recommendations that they would make would be ones that we would be inclined to adopt.

### TRANSITION TO PRIVATE SECTOR

Chairman HATFIELD. Why are the nonmonetary or the noncontractual ways in which you see them occurring then? Do you think this can occur effectively and with smooth transition without some kind of a blueprint?

Mr. TRIBBLE. There are a lot of things that are taking place that indicate that the transition is beginning to occur and one specific comes to mind. That is, a program that the American Institute of Architects has had to acquaint architects throughout the country with energy problems. They have put this program on with their own dollars. It is the most extensive program of this nature that they have ever undertaken and is designed to introduce the architects to innovations and energy technology, including passive solar applications, in their own self interest. If they, then, are able to design facilities that are more energy efficient, the AIA feels that this will raise the standing of the architects and will be in their interest.

To me, this is an example of a myriad of things that are taking place, many on a much smaller scale, that will effect the transition.

## INDUSTRIAL DECISIONMAKING

Chairman HATFIELD. I agree. I have talked to the home builders who have shut down now, a major part, at least, of their industry. I don't think we are ever going to go back to the old custom-built home as a mass type of housing. I think we are going to have to deal with costs of land, configuration of the housing, and matters of the square footage, the cluster, the tandem, and most important of all, the energy efficiency that has been ignored so frequently in the past.

I think all of that has to take a lot of blame and it has to come out of the industry as well. I just want to make sure we don't have a slippage here of what resource we have and research and technology and so forth, a matter of getting it out into the private sector for full utilization. I don't think you can dump off at times onto a segment of our economy a mass of material without it having some kind of media implementation and some kind of correlation of where they are at the moment, where the industry is.

If you would give that some very careful thought.

Mr. TRIBBLE. If I might make one other comment in that regard. That is, relative to the large number of homes that we now have and businesses and process industries that were built at a time when energy was inexpensive, they are really energy inefficient because of the economics that existed when they were built.

And now that energy is more costly, more emphasis is being put on the design of all of this equipment and it will be more energy efficient. In the past, inefficient buildings and equipment were built, but not because we did not know how to build energy efficiency into buildings and processes. It was simply a matter of economics, that it wasn't worth the investment to do so then.

Chairman HATFIELD. That is when oil was $5 a barrel.

Mr. TRIBBLE. Right; or even $2 a barrel.

So that now the builders who are building homes either for speculative or custom reasons are giving a great deal more emphasis to the energy efficiency, and there are things that have been known for many years that can be applied, and are being applied in the new installations.

## DEPLOYMENT OF ALTERNATIVE ENERGY SYSTEMS

Chairman HATFIELD. Secretary Tribble, there is also another factor in that equation, though, and that is, even though oil is now far more costly, which makes some of these alternative systems more economically feasibie compared to oil, I think we ought to be about the business of encouraging the utilization of some of these alternative energy systems to get off the dependence of imported oil, even where there may be a rough equivalency of costs today between oil and a renewable source.

I think the emphasis really should be on the renewable source, even at, perhaps, a higher cost factor at this moment until it is really cranked into our economy and can bring down the total costs by the greater utilization just to get off that political dependency as well as the economic dependency we have on the Middle East, which is a terribly fragile area.

Mr. TRIBBLE. I surely agree.

Chairman HATFIELD. Go back over the last 35 years. You will recall what has occurred out there in the Middle East—the political, military, and other such circumstances—it is very alarming.

### FEDERAL DEFICIT

Let me turn to your testimony on page 1 and at the top of page 2, where you say that the research is a proper Government role, and then you say, quote, "Bearing in mind that every dollar we spend we must borrow at the current high rate of interest." Of course, that is not limited to the matter of conservation and solar programs. That is, in effect, true with any Government program; isn't it?

Mr. TRIBBLE. It surely is.

Chairman HATFIELD. Yet we find ourselves wrestling with a higher deficit in the 1983 budget than we had in 1982 or 1981. Some of us think the deficit listed in the budget for 1983 was not realistic, that it is much higher than that according to the Congressional Budget Office and others.

So, really, this is not just something that applies to your program, is it?

Mr. TRIBBLE. That is right.

Chairman HATFIELD. Do you think the same criteria should be used on other programs?

Mr. TRIBBLE. I think the same criteria should be used on every dollar we spend in the Federal Government.

Chairman HATFIELD. We are in the hearing right here with hosannas, acolytes, and total unity of thinking——

[Laughter.]

Chairman HATFIELD [continuing]. From food stamps to the military?

Mr. TRIBBLE. That is right.

Chairman HATFIELD. You would include the Defense budget, I assume?

Mr. TRIBBLE. Yes.

### PASSIVE SOLAR PROGRAMS

Chairman HATFIELD. Let me turn to the question of the passive solar. Last year the Department reported the passive and hybrid programs were expected to yield from benefits of 40 to 125 times each Federal dollar spent. In view of this rather, I think, high return, 40 to 125 to 1, why are we terminating the program? It seems to be one of the most cost-effective efforts in the Federal Government.

Mr. TRIBBLE. I don't think we can look at that ratio and say that it is because of the Government programs that we are effecting these economies. Passive solar technology has been available for centuries. And it is only now that the cost of energy is high enough to bring the possibilities to the fore that they are being implemented. I have built three houses in my lifetime and at least two of them have passive solar applications, and the last one was built 23 years ago.

So if I built another one, I would employ all of the passive solar techniques that I could get my hands on. I really feel that that ratio is not representative of the investment that the Government has made.

On the other hand, the Government programs have suddenly emphasized the benefits that can be obtained from passive solar. We have sponsored and built some buildings that do not even have heating and air-conditioning systems, simply to demonstrate that they can operate without additional sources of energy in some rather severe climates. And the technologies are available and are being used. Witness the AIA program. So we feel that we can legitimately back away.

Chairman HATFIELD. Do you think the private industry or the trades industry are in the financial position to pick all of this up?

Mr. TRIBBLE. Yes; because passive solar is not an expensive addition to any home. The steps that can be taken to introduce passive solar measures increase costs relatively little.

### INTERNATIONAL SOLAR PROGRAMS

Chairman HATFIELD. Let me make a comparison, and I have to answer to my constituencies. These are all reductions. And you are aware of the one program where you have an increase over last year, SOLERAS, which is primarily a benefit to Saudi Arabia?

Mr. TRIBBLE. I don't believe I would agree with that last statement.

Chairman HATFIELD. Why?

Mr. TRIBBLE. We look upon this agreement—and incidentally, it was a commitment that was made before our watch began—but nevertheless, we look upon it as a commitment by which we can leverage the dollars we spend and get 50-percent participation. And that is a great deal more participation than we are able to get in many instances here in the United States. So that we are trying to put those dollars into activities that will give us a benefit.

Certainly, they benefit Saudi Arabia, too.

Chairman HATFIELD. What kind of benefit? Is this a monetary benefit you are talking about?

Mr. TRIBBLE. Increase in the technology. Let me ask my friend, Dr. San Martin, if it isn't true that most of the money that we have spent and that is being spent is going to industry in the United States?

Chairman HATFIELD. Domestic construction; is that it?

Dr. SAN MARTIN. To date, Mr. Chairman, the majority of the construction that is taking place has been in Saudi Arabia. There has been some construction in both countries, but the records indicate that the expenditure of funds has had approximately 80 percent of them spent with the U.S. industry in this cooperative program, regardless of where the facilities are located.

Chairman HATFIELD. So this is a subsidy to our industry?

Mr. TRIBBLE. This is truly a research program where we are pushing the state of the art. We work very closely with the activities going on in the domestic programs. So I cannot refer to this, honestly, as a subsidy program. It is a program that is advancing the state of the art which gives industry the opportunity to further the technology.

Chairman HATFIELD. Would you call it an incentive program to keep the oil flowing out of Saudi Arabia?

Mr. TRIBBLE. From my vantage point, Mr. Chairman, I would not be qualified to answer that question. [Laughter.]

Chairman HATFIELD. Are they hard pressed financially over there? [Laughter.]

This might be part of our foreign aid program.

You see how certain incongruities can emerge, though, out of this kind of thing. Here we cut, cut, cut, and reduce, reduce, and then in this instance there is a twofold increase in the 1983 budget over the 1982 level.

Mr. TRIBBLE. I think that also has to do with the fact that we deferred $4 million from 1982 into 1983; is that right? This does, in fact, terminate our commitment to this agreement.

Chairman HATFIELD. We are bailing out of this, you mean?

Mr. TRIBBLE. No; but this will be our last expenditure. The $9.5 million in 1983 completes our full obligations.

### GEOTHERMAL

Chairman HATFIELD. Mr. Secretary, I understand the Vale User-Coupled project is on track; is that correct?

Mr. TRIBBLE. Yes.

Chairman HATFIELD. That is a very important project.

### GEOTHERMAL RESOURCES DEVELOPMENT FUND

Let me turn to the geothermal loan guarantee program for just a question or two.

As I recall, there was a directive made by this committee to the agency concerning continued implementation of the geothermal loan guarantee program. How many of the pending applications have been evaluated and have you issued any loan guarantees?

Mr. TRIBBLE. There was a period of time—if I make a misstatement you straighten me out here—during most of the latter part of 1981 in which there was little activity in this program. We had received, as I recall, six applications through the San Francisco office that had been recommended.

In December, we met with representatives of a number of the companies involved and other interested people, and at that time we received five additional applications that had not come to us in headquarters. Incidentally, those 11 applications that had been submitted would use all of the funds that have been approved. We agreed at that time that we would put a notice in the Federal Register that we would not at that time accept any additional applications. We would evaluate those that had been submitted and go forward with decisions. Since that time, I believe, we have instituted the reevaluation of those that had already been sent to us.

I think we have had decisions on three. Is that right, Bob?

Dr. SAN MARTIN. Three have been presented to you, and every one of them was lacking some data required for a formal decision. And we have gone back to collect information. I would like to point out that we have been proceeding in good faith with the intent of Congress in processing all of these applications and are making sure that they are all duly considered.

It ends up that in retracing history, before I was personally involved in this, that process, once the paperwork got to headquarters, was taking 2 to 3 months per application. We have put together a special task force to handle that. We are now able to evaluate these submissions in about 2 weeks per application.

We don't have the resources to do them all simultaneously, so we are taking them sequentially as they chronologically have been available. But we are proceeding as fast as we can, Mr. Chairman, to act on all of the applications.

Chairman HATFIELD. You have three that have reached a point of serious consideration, based upon completing the formal application?

Dr. SAN MARTIN. That got to the final point where the decision official receives the formal presentation for decision. In that final review, there have been small items that have been uncovered of uncertain information and we have requested that the applicants clarify these. But I expect the actions and formal decisions will be proceeding at a very fast rate.

Chairman HATFIELD. Can you give me a timeframe of when you expect to get those three to the final decision point?

Mr. TRIBBLE. The last one was more extensive than the other two. We had to go back and get substantial additional updating of financial information and that instruction has been given to Dr. San Martin.

The questions regarding the other two are relatively minor and those decisions should be made soon; is that right?

Dr. SAN MARTIN. Yes. I would expect that kind of information will be available for your decision, Mr. Tribble, within a week or two at most. We could then authorize our field organization to proceed with the formal negotiation to enter contractually into the agreements with the proposers so they could proceed with the project. I don't want to leave the false impression. Our previous experience with the handful of geothermal loans that have been placed, ones that have been authorized by headquarters, is that, typically, to finalize an award, does take many months just because of the intricacies of the financial negotiations that the contractor has to enter into in finalizing his own loan with the commercial lender.

Chairman HATFIELD. What range of money are we talking about in capital on these?

Mr. TRIBBLE. Up to $6 million; is that right?

Dr. SAN MARTIN. There is, if I recall correctly, over $300 million of loan authority that is left and the applicants in aggregate, if they were all approved, would exceed that authority.

Chairman HATFIELD. You don't anticipate they will all be approved, though?

Dr. SAN MARTIN. I do not.

Chairman HATFIELD. So we don't have to go back to change the obligation authority?

Dr. San Martin. No, sir.

As you will recall, one of the items that we are intellectually nervous about in that account is that there is a very minimal default reserve for that guarantee program. So we are honestly going through extra efforts. We do not want the taxpayer to be burdened with $300 or $400 million in loans that go into default where we have to come back for a supplemental. So we are trying to assure that enough background work has been done, that the contractor has a high probability of success.

Chairman Hatfield. Why is that default fund so low?

Dr. San Martin. To the best of my knowledge, Mr. Chairman, that was a combination of the wisdom of administrations, wisdom of legislative bodies.

### RISK CAPITAL

Mr. Tribble. Let me mention one thing. It is pretty tough on some of these decisions. You know, if it is a good deal, they should be able to go to the bank and borrow the money. And if it is not a good deal, we have a tough time approving it. So that you have a real narrow path to try to stay on.

Chairman Hatfield. Have you dealt with bankers lately?

Mr. Tribble. I know, I think I know the question you are addressing; that is, that they like to have all the collateral they can get.

Chairman Hatfield. Yes; and when you get into areas of new technology and new ideas which have not been proven, untried, that pretty well falls into risk capital in their thinking. So you can have an awfully good idea. I am not so sure that—did Henry Ford get his help from a banker? I don't think so, when he went into the automobile business, I am not sure now, but it seems like an awful lot of these things have had to be funded from other than the traditional conservative banking industry. I am not necessarily in agreement with you that if something is good, the bankers automatically are going to help finance it.

Mr. Tribble. Good point.

Chairman Hatfield. We found this true in oscilloscopes, in the area of a lot of our modern technology. Dave Packard can also testify to that, as well, in his area of electronics.

I would like to have you give us a report when you make those final determinations on those that are pending. Would you let us know?

Mr. Tribble. Surely.

### GOODNOE HILLS WIND PROJECT

Chairman Hatfield. One final area I would like to turn to is wind energy, and to a specific project in Goodnoe Hills, Wash. There were problems last year with the Mod-2 wind turbine. As you know, I believe this is the first experimental cluster of large wind turbines that this Nation has operated.

I gather the information from talking to some of these people out in the Northwest that they feel very strongly the need for further operational tests to take advantage of the present sizable investment prior to the transfer of the three machines to the Bonneville Power Administration, which I think is the ultimate step.

Are you familiar with the technical problems that have been raised and the need of more testing?

Mr. TRIBBLE. I am familiar with the accident, of course, and what did take place, and that has been largely repaired. In this installation, a large amount of the information that was needed was learned very early because the structural support and the rigidity, or the lack thereof, is one of the critical elements in the operation of these machines. The frequency with which the rotor turns is critical. It must not rotate at the critical speed which would set up harmonic vibrations and cause structural problems. The information of this nature was learned very quickly and these structures seem to be adequately flexible to absorb the loads that are on them.

On the other hand, there is a lot of gust effect and uneven wind conditions that still need to be studied. Further, the effect of having machines in a cluster where each can have an effect on the other, depending on the wind direction. That is largely, I think—that information has been, to some degree, gathered.

I know a great deal of the other problems such as interfacing with the utility, coming on the line, going off, depending on when the wind is blowing, control, and all of these other facets of the operation of this kind of thing. I am not sure that I know what you may be referring to.

Bob, do you? Additional work, additional testing?

### ADDITIONAL OPERATIONAL TESTING

Chairman HATFIELD. The general idea that I get is that there is insufficient testing. The present assessment is that they need to continue this testing program to work out some of the questions or some of the concerns that they have.

Mr. TRIBBLE. Aren't we planning to do considerable additional testing?

Dr. SAN MARTIN. I believe the root of the question involved is that several years ago as the Mod-2 program was planned, there was an intent to perform a certain amount of testing after the facility was constructed for a certain period of time. We have run into some financial difficulty because the accident itself caused us to lose time in the schedule and caused us to convert a good deal of effort into insuring that we completely understood what happened and that appropriate action is taken such that it would not occur in any of the other machines. That particular effort, of course, took funds, diverted funds, in essence, that had been intended for a test period.

When you sit down and try and put together a logical list of priorities with regards to the budgets that we are proposing to the Congress, we have proposed a reduction of the effort that was originally laid out in the contract for that particular development.

We are, as I believe you are aware, talking very seriously to the Bonneville Power Administration to see what authority they may have to participate more substantially in this effort than they have in the past.

There is a portion of the request for 1983 that would allow testing to continue, but not the effort that was envisioned a few years ago when this project was laid out.

Chairman HATFIELD. Let's get to the bottom line. I think it is important that this additional testing go forward—we have invested a great deal of money in this project. I think it would be penny-wise and pound-foolish to abandon this and not to undertake the tasks originally scheduled because of the accident that has sucked up a lot of the dollars that otherwise would have been used on testing or other related work.

If we have to reprogram money, if we have to give you additional budgetary resources to do so, or if you can work out some kind of arrangement with Bonneville, that is fine. But I think the bottom line is, I would like to get a commitment from you, Mr. Secretary, that we are going to pursue this to its completion now that we are this far committed.

Mr. TRIBBLE. I agree with you 100 percent and there is no question that we will do that.

Chairman HATFIELD. Let us be helpful on however we work this out within the confines of your budget, within the constrictions placed upon you. I don't consider this as outside of the President's proposal, so that you are restricted under the OMB memorandum that has been sent out by Mr. Stockman—and I referred to it yesterday—that prevents you from answering questions that I might pose to you as chairman of the Appropriations Committee. I realize more and more how little authority there is in this position. [Laughter.]

I used to think it was a powerful position until I found myself sitting in this chair. I was talking to Senator Magnuson on the phone one day and he said, "How do you like it?" I said, "You know, when you used to say, 'Yes, yes, yes,'" I said, "All I do is say, 'No, no, no.'" It is a little different role. But I do hope that we can get the information exchanged here within the constrictions of your censorship that we can move this program on to completion. [Laughter.]

Mr. TRIBBLE. That is our intent in all of these installations. We certainly realize that we have substantial investments, and in those that are in the testing stage, we intend to do adequate testing to learn everything that we can from it.

Chairman HATFIELD. Are there any other comments that you wish to offer? Are there questions you want to ask me?

Mr. TRIBBLE. That is an opportunity.

Chairman HATFIELD. I don't offer this very often. [Laughter.]

## ADDITIONAL PREPARED QUESTIONS FOR THE RECORD

Mr. Secretary, I do have several other questions, as does Senator Schmitt, that we will submit to you for response.

Mr. TRIBBLE. We would be pleased to respond, Mr. Chairman.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY SENATOR HATFIELD

### Tax Credits

Question: In the budget justification, the Department repeatedly refers to the fact that tax credits ... will assist the private sector development of solar products and reduces the need for federal spending R&D. On the other hand, the President has proposed elimination of the tax credits. Can you explain the apparent inconsistency?

Answer: The tax credits proposed for elimination are the business energy tax credits now scheduled to expire at the end of 1982 and 1985. The tax credits mentioned in the budget justification are those available through the Economic Recovery Tax Act of 1981.

Question: The solar industry proposes that the energy tax be extended to the year 1995 at a minimum level of 15 percent. What is your view?

Answer: The Administration opposes such an extension. We believe that there is no longer any need to extend these credits because oil prices have been decontrolled and other energy prices are fast seeking their proper levels. These developments will provide sufficient incentive to invest in renewable energy.

### Federal Role in Conservation and Renewables

Question: On page 1 and the top of page 2 of your prepared statement, you indicate that funding is requested in FY '83 for "research that is a proper government role . . ., bearing in mind that every dollar we spend, we must borrow at the current high rate of interest." In future years, what role, if any, do you see for the federal government in the areas of conservation and renewable energy R&D?

Answer: In future years, the Federal Government is expected to continue its current policy regarding the conservation and renewable energy technologies. In partnership with industry, universities, and the national laboratory system, the government should support programs which lead to fuller understanding of fundamental scientific engineering mechanisms of energy utilization and which lead to increased amounts of energy produced through renewable resources. Research should focus upon elements that attract insufficient or no private venture capital because of large or unpredictable technical risks, or where the risks are either too large or unpredictable, or the payoffs are too long range. Therefore, the government can be expected to emphasize multi-technology or generic long range high risk research and development, although projects aimed at proof-of-concept may be appropriate depending upon the degree of innovation and complexity involved.

## Active and Passive Solar

Question: There is no mention in your testimony of the active or passive solar program. Please give a detailed justification for the zeroing of these activities.

Answer: After nearly a decade of primarily federal support, the active heating and cooling, and the passive and hybrid solar technologies have progressed to the point where the private sector has appropriately begun to support continued development and commercialization of these technologies with private investments. In the active area, the market is characterized by strong growth, in spite of the general economic downturn. Sales in 1981 were $450 million, a 30% growth over 1980 sales. An increasing number of solar companies turned the corner toward profitability in 1981 with a consolidation trend developing among solar collector manufacturers. The evidence of private sector willingness to continue with passive development activities heretofore supported by the Federal Government can be found in the recently available 1981 Passive Solar Products Catalogue. This catalogue lists several new commercial products which are the outgrowth of previous Federal passive programs. In our view, it is not the role of the Federal Government to assume a further responsibility in these areas, but to concentrate on the more long-range, high-risk advanced research and development efforts which the private sector could not be expected to undertake.

Question: Last year, the Department reported that the passive and hybrid programs were expected to yield from 40-to-1 to 125-to-1 for each federal dollar spent. In view of this high return, explain your proposed termination of the program.

Answer: The expected yield of 40-to-1 to 125-to-1 for each federal dollar spent was based on an analysis of oil equivalent dollars which could be saved by passive and hybrid programs by the year 2000, assuming ongoing, federally-supported programs of both technology and market development. What this says is that the Government has spent one dollar to save the private sector from 40 to 125 dollars. Return on investment is usually calculated on the basis of the investor reaping the benefit. It is precisely this "fantastic payback" that makes private sector investment in passive solar so attractive. In view of this payback benefit, the private sector is expected to more than replace Federal spending in passive and hybrid technology and market development activities.

Question: In your view, is the private industry -- the building trade industry -- in a financial position today to pick up these federal activities?

Answer: In spite of the economic downturn, there are elements of the building trade industry in a position to enter the innovation stage in the further development of state-of-the-art passive technology, for others to follow as the economy recovers. For example, evidence of this can be found in the recent appearances of sunspace designs in new townhouse condominium complexes. Also, the increased market activity in home remodeling and retrofit, and the emergence of new limited partnerships which are venturing to meet the increasing demand for rental units, all offer excellent opportunities for the building trade industry to improve upon the passive technology currently available.

## Geothermal Programs

Question: In the FY 1982 Senate Report, the Committee directed you to proceed with the final arrangements to complete the two remaining user-coupled projects which were pending before the Department. What is the current status of these projects? When will action be completed on these projects?

Answer: We have authorized our Idaho Operations Office to begin negotiation of a Cooperative Agreement for the geothermal fuel-alcohol project at Vale, Oregon. We would expect that drilling could begin well before the end of the fiscal year. With regard to the hotel heating project in Reno, we have not yet authorized the obligation of funds or the negotiation of an Agreement. Our staff is studying the proposal and we expect to arrive at a decision prior to the end of the fiscal year.

Question: What are your plans for the Raft River project in FY 1983?

Answer: A solicitation for Cooperative Agreement Proposal (SCAP) was issued April 1, 1982, for a user to manage and operate the Raft River Geothermal Facility as an electrical generation R&D plant at no cost to the government, in accordance with Congressional intent. If there is no successful proposal, the facility will be declared excess and the site restored to comply with Bureau of Land Management and National Environmental Protection Act requirements.

Question: As you know the Congress strongly supports the geothermal demonstration plant at Heber, California. What is the status of the Heber binary cycle project?

Answer: DOE is proposing to the industrial partners that the Federal funding for the project be completed in FY 1982 and the cooperative agreement be renegotiated to reflect reduced government involvement in the project.

## Geothermal Loan Guarantee Program

Question: Mr. Secretary, would you tell the Subcommittee what steps you have taken to comply with the directive of this Committee and the Congress to continue implementation of the Geothermal Loan Guarantee program?

Answer: The Department had 11 applications pending as of March 1, 1982, when a notice was placed in the Federal Register indicating that, at that time, the Department would accept no loan guarantee applications for new projects. We have accelerated the review for these eleven projects.

Question: How many of the pending applications have been evaluated?

Answer: Of the 11 applications, 2 have been returned for updating for re-evaluation, 2 were not accepted, 1 applicant has withdrawn, and 6 are under active evaluation and negotiation.

Question: Have you issued any geothermal loan guarantees?

Answer: No new geothermal loan guarantees have yet been issued.

## Wind Energy

Question: As you know, there were problems last year with the Mod-2 wind turbines at Goodnoe Hills, Wash. This is the nation's first experimental cluster of large wind turbines. There appears to be a need for further operations testing to take advantage of the sizable government investment, prior to transfer of the 3 machines to BPA.

Are you familar with the technical problems and the need for more testing?

Answer: We are familiar with the technical problems associated with the Mod-2 wind turbines. The initial test program began early in 1981 and generally went well. In June 1981, however, unit one oversped during a simulated emergency shut-down test in high winds. All three machines were shut-down while the cause was investigated. A flaw in the emergency hydraulic control subsystem was found, and the control system has since been modified to prevent a reoccurrence. Units 2 and 3 have been back in operation for several months, and unit one was returned to operation on April 14. Completion of acceptance testing should occur shortly thereafter in May.

Upon completion of acceptance testing, we anticipate performing cluster interaction, acoustic, control and other research tests during the remainder of the fiscal year. By then, the basic performance and operating characteristics should be known. Analysis of the data and validation of computer models using that data will continue in FY 1983. We are developing plans now to transfer the machines themselves, following completion of the research tests in FY 1982, to the Bonneville Power Administration or other operating entities for long-term operation.

Question: In FY 82, Congress provided funds to predesign the next generation of large wind turbines - Mod-5. In your statement, you indicate that "completion of this phase will increase the capability of the private sector to pursue further development." The private sector companies, however, are indicating that there is need for additional Federal support due to the risks involved or further progress on large wind technology will be halted. What is your reaction to this problem?

Answer: As you know, we are continuing the Mod-5 wind turbine development programs by both General Electric and Boeing Engineering and Construction Company. Once the preliminary design phase, related development testing and engineering are done, we believe those two companies should be in a position to proceed without support from the Federal government. We believe interest shown by utility companies and "windfarm" groups supports our position.

## Solar Thermal

Question: On page 5, you indicate that "U.S. industry is the world's leader in solar thermal technology." According to most experts this has occurred with the support of the Federal government, both tax credits and spending on R&D. Can the U.S. maintain its position with a funding reduction of over 85% in one year (FY81)?

Answer: In our opinion, maintenance of U.S. leadership will depend on development of the domestic market for technology already in hand as a result of Federal programs. In this regard, the U.S. is in a uniquely favorable position among industralized countries, in that domestic applications exist that are economically viable and which can serve to firm up products and prices for international competition. The continuing research activities that we are proposing are considered to be an appropriate complement to the private sector commercialization activities already underway.

Question: In FY83, it appears that you request a total of $9.5 million for the Barstow project. Is this the final installment to be requested, and if so, will the anticipated operation give us an "optimum amount" of useful data?

Answer: The FY 1983 request for the 10 MWe Pilot Plant is $9.5M. These funds are requested to provide the necessary software for plant level controls and for the operation, maintenance and test activity during the Test and Evaluation phase scheduled to begin in July 1, 1982, per the requirements of the Cooperative Agreement with the Associates (SCE, Los Angeles Department of Water and Power, and the State of California). However, negotiations are underway with the Associates to transfer the Pilot Plant to the private sector, in which case no additional funds will be required in FY 1984. In the event of transferring the facility, DOE expects the Associates to operate the facility for a two-year experimental phase, during which extensive data collection and data reduction is contemplated.

Question: What are your plans in FY83 for the parabolic dish system at Shenandoah, Georgia?

Answer: The parabolic dish Solar Total Energy Project in Shenandoah, Georgia will complete the final acceptance test in late April, followed by a 21-month experimental operation period. Through a cooperative agreement between DOE and Georgia Power, DOE will provide funding to operate the facility through December, 1982. Transfer of title for the solar system to Georgia Power is anticipated by September, 1982. During FY 1983, Georgia Power will continue to operate the facility under the cooperative agreement without further DOE funding. Georgia Power will also continue to provide experimental performance data in FY 1983.

## Photovoltaics

Question: In FY 82, Congress provided $6.8 million for the ongoing project at Georgetown University - the National Exemplar. As I recall, DOE had proposed terminating the project in mid-stream. Has the funding been allocated and the federal role completed?

Answer: The Department has allocated $5.4 million in FY 1982 funds to complete the National Exemplar project at Georgetown University. This will also complete the federal role in this project. The $6.8 million amount was specified by Congress for the Sacramento Municipal Utility District project.

Question: Congress also provided funds in FY 82 for a cost-shared utility project with the Sacramento Metropolitan Utility District (SMUD). What is the status of this project? Are funds requested in FY 83? Why not?

Answer: The Department is proceeding with a one megawatt photovoltaic utility project to be cost-shared by the Sacramento Municipal Utility District (SMUD) and the California Energy Commission. A cooperative agreement is expected to be signed with SMUD in early summer. The one megawatt plant will be completed approximately 24 months after signing of the agreement, using $6.8 million in FY 1982 funding as specified by Congress. No funds have been requested in FY 1983 as the FY 1982 funding will support the project through completion in FY 1984.

Question: The photovoltaic energy budget is proposed to be reduced by $57 million to $27 million in FY 83. Please provide for the record a detailed list with FY 82 funding levels of the activities which will not be funded or will be funded at a reduced level in FY 83. Also include the proposed FY 83 funding level and the level that was requested in the Department's internal review budget.

Answer: The requested FY 1983 funding level is $27,035,000. The level that was requested in the Department's internal review budget for FY 1983 was $48,000,000. A list of activities with FY 1982 funding which will not be funded or will be funded at a reduced level in FY 1983 is as follows:

| Activity | FY 82 ($000) | FY 83 ($000) Internal | FY 83 ($000) Congress |
|---|---|---|---|
| Test and Applications: Construction and test and evaluation projects (SMUD, Exemplar, Residential Experiment Stations, Eight PRDA projects, etc.) | $12,200 | $6,000 | $ 0 |
| Technology Development: Development testing and qualification of advanced modules and arrays | 3,600 | 3,000 | 0 |
| Systems R&D: Development of power conditioners, concentrator modules, array structures, optimization modeling, reliability analysis, etc. | 18,200 | 5,000 | 0 |
| Advanced Concepts Research: Critical manufacturing processes, modeling utility interaction, developing electrochemical cells | 11,400 | 8,000 | 2,000 |
| Capital Equipment | 4,000 | 1,000 | 0 |

## Solar International

Question: Mr. Secretary, the only program proposed for an increased in your area - a doubling of FY 82 funding - is the SOLERAS program which is of primary benefit to Saudi Arabia. Why is the increase needed or even desirable especially in light of the other solar cuts?

Answer: It is important to recognize that the United States, and the U.S. solar industry, benefits substantially under the SOLERAS program. SOLERAS entails a 50/50 cost shared program for research which should significantly advance our understanding of several technologies. Additionally, approximately 80 percent of project funds have been awarded to U.S. businesses.

The $9.5 million request for FY 1983 is the final U.S. payment under the SOLERAS agreement with Saudi Arabia. The Agreement requires each country to deposit $50 million over a five year period into a special U.S. Treasury Trust Account to carry out solar research, development and demonstration activities. A calendar year deposit schedule was agreed to by the U.S. and Saudi participants.

The $9.5 million request for FY 1983 is not an increase in funding for SOLERAS as it includes a portion of the calendar year 1982 funding requirement and the final $5 million payment due in calendar year 1983 to complete the program.

Question: What has been the U.S. full commitment to the SOLERAS Program including the FY 83 proposed request?

Answer: The U.S. Saudi Arabia Joint Agreement in Solar Energy requires each country to deposit $50 million in a special U.S. Treasury Trust Acccunt to pay for joint projects in solar energy R&D.

Question: How much of the FY 83 request will be used for activities in Saudi Arabia? Provide a breakdown of funding in FY 83 for each key activity outlined in the budget justification.

Answer: Major funding in FY 1983 under SOLERAS is planned to be expended on the Solar Powered Water Desalination Project and the Solar Closed Environment Agriculture Project. Multiple designs are presently being developed in order to promote technical and cost competitiveness. Location of the resulting projects has not been determined to date. However, it is estimated that at least 80% of the funds will be expended in the U.S. because of the American design and construction companies currently participates in the projects.

The FY 1983 appropriation will be deposited in the Treasury Trust Account along with Saudi Arabian funds and existing funds from previous deposits. The expenditures from the Trust Fund will be determined by the SOLERAS Executive Board to cover operational expenses for on-going projects and for projects selected for implementation based upon Board evaluation of the results of design studies for the desalination and controlled agriculture programs.

Question: What role was played by Congress in the execution, revision, and implementation of the Project Agreement?

Answer: The various DOE and Treasury oversight committees and/or their staffs have been briefed each year on the status of the SOLERAS Agreement and the progress of the projects thereunder. Congress has its traditional role with regard to this program through the normal authorization and appropriation process.

## Solar Budget

Question: Mr. Secretary, if Congress appropriates approximately the same amount for solar activities for FY '83 as for FY '82, how would your department propose to spend the money?

Answer: The Department continues in its belief that the FY 1983 Budget proposed by the President represents an appropriate commitment to development of the renewable energy technologies. Additional federal investment does not appear prudent given the other needs served by the consolidated budget. Accordingly, the Department has made no specific plans for spending the amounts of money suggested within the question. The Department would consider carefully specific recommendations which this, or any other congressional committee, may wish to offer.

## Electric Energy Systems (EES)

Question: In layman's terms, what is the level of transmission loss associated with the electrical systems of this country? What is the value of that electric energy?

Answer: In 1980 the total sales of electric energy was 2130 billion kwhr and the output of all generating plants was 2350 kwhr. From this we know that there is an electrical loss of about 9% from the generator to the customers' meters. This amounted to 220 billion kwhr or 2.2 Quads of primary fuel input.

The price of electric energy (in 1981 dollars) delivered to the residential/commercial sector was approximately 6¢/kwhr in 1980 and is estimated to rise to about 7¢/kwhr in 1990. On this basis, the value of the losses would be approximately $13 billion in 1980.

Question: Why do you believe there is no Federal R&D role to develop and improve transformers and electrical conductors? What is the difference between R&D on transformers and battery R&D?

Answer: With regard to transformer and conductor R&D, the greater Federal presence advocated by previous administrations is not a desirable goal. It is our belief that utilities, EPRI, utility equipment manufacturers, and universities will build, over time, on the work formerly sponsored by the Department. The cost-sharing contracts that we have had with industry will have served as seed money. For example, in the case of the advanced transformer project, private sector contributions toward completing the first phase have been increased, and it is expected that the next phase, involving prototype development and testing, will be funded entirely by the private sector. Also, we have completed fabrication of the 100 meter superconducting test cable at Brookhaven National Laboratory, which will undergo power tests this year.

In contrast with transformer R&D which is ready for private sector take over, battery R&D has not reached this stage. In the case of battery R&D, the government role should be one of assisting in the support of the more fundamental processes relating to advanced electrochemical couples. Our generic research base in FY 1983 will support long-range improvements and development, by industry, of new classes of advanced batteries which are still required if significant oil savings are to be obtained from electric vehicles.

Question: Can you provide any evidence that the private sector is ready to step in and perform this type (Electric Energy Systems) of R&D?

Answer: It is still early to assess industry efforts to continue EES activities. However, three examples come to mind. One is the gas insulated transformer, where the private sector has increased its contribution from $1.3 million out of $8.4 million in the original plan to $2.4 million out of $8.9 million in the most recent plan. Prototype development and testing -- the next phase -- will be entirely by the private sector.

A second example is in the area of distribution lightning analysis. Over the past 4 years DOE/EES developed a unique lightning detecting and recording device. Once proven, it has been turned over to EPRI. They have an RFP to implement the widespread use of this device and to carry out data analysis from installations at interested electric utilities.

The third example is the Battery Energy Storage Test (BEST) facility. The responsibility for operating the BEST facility can be shifted to EPRI (now a co-sponsor with DOE) and/or individual utilities in 1-2 years.

Question: If the Congress determines that this program should be continued at essentially the current level in fiscal year 1983, will sufficient personnel resources be provided to carry out the Congressionally-mandated program?

Answer: Yes. The Department would make every effort to comply with the intent of Congress.

Question: What is the current status of the submarine cable R&D?

Answer: This R&D is in two parts: (1) Cable research, and (2) Hawaiian Deep Water Electrical Transmission Cable Demonstration Program. With regard to cable research, two cable technology development efforts were initiated -- an ocean bottom cable and a riser cable, both in support of the OTEC program. For the past year, the research has been broadened to cover a generic submarine cable to accommodate all applications, including those for very deep (7000 ft.) long distance (over 50 miles) requirements. The sea bottom cable research is now a part of the Hawaiian project described below. The riser cable research is nearing completion for floating OTEC plant applications.

In the Hawaiian Project, a revised unsolicited proposal has been received from the Hawaiian Electric Company to perform research on the high risk portions of the cable and splice, repair, retrieval, and cable ship concepts and designs for deep water applications. This proposal has been accepted and a procurement package is being finalized and processed through the Department. It is planned that a contract will be awarded in the summer.

## QUESTION SUBMITTED BY SENATOR SCHMITT

### HOT DRY ROCK

Question: In light of commitments to the Japanese and the Germans, the Department's budget allocation of $2.5 million to the hot dry rock program appears to be miguided. A reduction in the FY 1982 level of $9.7 million to $7.5 million in FY 1983 would appear to be more reasonable. Will a FY 1983 level of $2.5 million result in an end to the contribution of our partners in this venture?

Answer: On April 22, 1982, at a meeting of the IEA Steering Committee for the Fenton Hill Hot Dry Rock Project, the matter of the Department's FY 1983 budget request was discussed. Neither the German nor Japanese representatives indicated whether they would end their contributions if the U.S. contribution were $2.5 million.

## SUBCOMMITTEE RECESS

Chairman HATFIELD. With that, we will recess until Wednesday, April 21, at 2 p.m., in room 1223, this same room, for a closed hearing on the Energy defense portion of the DOE budget.

[Whereupon, at 11:05 a.m. Thursday, April 15, the subcommittee was recessed to reconvene at 2 p.m. Wednesday, April 21.]

# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 1983

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WEDNESDAY, APRIL 21, 1982

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
*Washington, D.C.*

The subcommittee met at 2:10 p.m. in room 1223, Everett McKinley Dirksen Senate Office Building, Hon. Mark O. Hatfield (chairman) presiding.

Present: Senators Hatfield, McClure, Schmitt, and Johnston.

## DEPARTMENT OF ENERGY

### ATOMIC ENERGY DEFENSE ACTIVITIES

### STATEMENT OF HERMAN E. ROSER, ASSISTANT SECRETARY FOR DEFENSE PROGRAMS

**ACCOMPANIED BY:**

- **ROGER E. BATZEL, DIRECTOR, LAWRENCE LIVERMORE NATIONAL LABORATORY**
- **TROY E. WADE, PRINCIPAL DEPUTY ASSISTANT SECRETARY FOR DEFENSE PROGRAMS, DEPARTMENT OF ENERGY**
- **RICHARD L. WAGNER, ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY)**
- **JOHN EMMETT, ASSOCIATE DIRECTOR, LAWRENCE LIVERMORE NATIONAL LABORATORY**

### OPENING REMARKS

Chairman HATFIELD. The hearing will come to order.

The purpose of our hearing today is to receive testimony on the fiscal year 1983 budget proposal for the atomic energy defense activities within the Department of Energy.

We are going to have to conduct the hearing a little bit differently than normal due to the scheduled joint session. We have a cloture vote at 2:45, then a joint session following that.

I wonder, Mr. Secretary, if we could have you summarize some of your comments—your full statement will be placed in the record. Then I have a list of about 90 questions that I will submit to you for response. And I am sure that Senator Johnston has questions, and perhaps other members of the committee. Then we may wish to call you back later after we receive the responses to those questions and go over some of the answers with you.

I am very sorry about the situation we find ourselves in today. It is something that neither Senator Johnston nor I could control as to the floor activity today. And I know the people from the Lawrence Livermore Laboratory, and others, have come some distance. It is not a very proper thing, but that is the way it is here in Washington.

Mr. ROSER. We understand perfectly, Mr. Chairman. It was my intention just to summarize my statement anyway. I think I can do that in 15 or 20 minutes.

Chairman HATFIELD. Why don't you do that and introduce your colleagues who have accompanied you, and we will proceed on that basis.

### PREPARED STATEMENT

Your full statement will be made part of the record at this point.

[CLERK'S NOTE: Due to the classified nature of the material and the cost of printing, several of the charts and photographs accompanying the statement have been deleted.]

[The statement follows:]

## STATEMENT OF HERMAN E. ROSER, SECRETARY FOR DEFENSE PROGRAMS, DEPARTMENT OF ENERGY

### INTRODUCTION

Mr. Chairman and Members of the Committee, I am pleased to have this opportunity to testify on behalf of the Agency's Fiscal Year 1983 budget request for those Atomic Energy Defense Activities under my cognizance as Assistant Secretary for Defense Programs, which include all of those activities except the Naval Reactors Program. These activities for which I am responsible are the Weapons Program which includes Inertial Fusion; our Verification and Control Technology effort; the Nuclear Material Security and Safeguards work; the Agency's Security Investigations function; our Nuclear Materials Production program and the Defense Nuclear Waste Management activities.

Before I begin to describe the tasks of great National importance underlying our budget request, I want to make two points. First, the budget transmitted to the Congress in February was based on meeting the requirements of the FY 1981-1983 Nuclear Weapon Stockpile Memorandum (NWSM), which was our weapons program production authority, valid at the time this budget was prepared. Now, however, we have in place a new NWSM, approved by President on March 17, covering the new weapon production requirements in the FY 1983-1997 time-frame.

[Deleted.]

Accordingly, my testimony today will address our new programmatic instructions contained in the FY 1983 NWSM and both the Supplemental and Budget Amendment requests necessary for us to carry out those instructions.

The second point I would like to bring up is the Administration's proposed placement of the Defense Programs organization in an

Energy Research and Technology Administration, a separate operational entity within the Department of Commerce. I participated in the Steering Committee which developed the proposed organizational concept, and I believe that it will work. I have met with Secretary Baldridge and found him to be very interested in the Atomic Energy Defense Activities, and I found him to share my convictions concerning the importance of this work.

## DEFENSE PROGRAMS OVERVIEW

(Chart 1) The mission of the Defense Programs organization is as shown here. All of these tasks support or otherwise contribute to or are derived from our primary function of research, design, testing, and production of our Nations's nuclear weapons.

(Chart 2) Since the last time these programs were presented to this Committee, we have formalized a new organizational structure, with three new Deputy Assistant Secretaries, one for Military Applications including Inertial Fusion, General Hoover, here; a Deputy Assistant Secretary for Nuclear Materials, Dr. Gilbert; and a Deputy Assistant Secretary for Security Affairs, Mr. Culpepper. Those who were in an "acting" capacity at this time last year have now all been formally appointed to their respective positions. Further, at this time last year, the Nuclear Waste Management organization reported to the Assistant Secretary for Nuclear Energy on commercial matters and to the Assistant Secretary for Defense Programs on defense waste matters. Now, a new Office of Defense Waste and Byproducts Management is in place under Dr. Gilbert, enabling our direct control over the management of Defense Waste and facilitating closer coordination with the Materials Production program, the source of most of the nuclear waste we manage.

(Chart 3) The Agency's FY 1983 amended budget request for Atomic Energy Defense Activities totals about $5.8 billion, as indicated on this Chart. Of this amount, $5.4 billion is for Defense Programs with the remainder for the Naval Reactors Program. The Defense Programs supplemental request for FY 1982 is $97.4 million, raising the FY 1982 total to about $4.4 billion. The requested increase for Defense Programs in FY 1983 over FY 1982 is about $1.0 billion, or approximately 23 percent.

In the context of our responsibilities, this is an austere budget, reflective of the need for restraint in Federal spending. But at the same time, it does provide the resources we need to meet the FY 1983 Nuclear Weapons Stockpile Memorandum. Further, it provides for continuing initiatives to assure the vitality, develop the stability, and restore the capabilty of the Defense Programs Complex necessary to enable us to meet our nuclear defense requirements in the future.

First, I would like to discuss our plans for FY 1983 in the nuclear weapons program.

## NUCLEAR WEAPONS PROGRAM

I would like to begin by describing the weapons complex for you.

(Chart 4) Here are the locations of our major weapons program facilities. The nuclear weapons complex includes three design laboratories, the Nevada Test Site (NTS), and seven production facilities. Of the three laboratories, the Los Alamos National Laboratory (LANL) and the Lawrence Livermore National Laboratory (LLNL) are responsible for nuclear design, while the Sandia National Laboratories (SNL) are responsible for ordnance engineering. All three are broad-based, multiprogram laboratories skilled in the physical sciences and engineering. The NTS is the only location where underground nuclear tests currently are conducted by the United States. The seven production facilities are spread throughout the U.S. and operate as an integrated industry with each facility responsible for production of specific weapon parts or components. Final assembly of nuclear weapons is performed at the Pantex plant near Amarillo, Texas. Perspective of the national scope and size of the nuclear weapons complex can be gained from the following:

- major facilities are located in ten states;
- facilities occupy a total land area about the size of Delaware;
- the average FY 1982 contractor employment will be about 34,500.

(Chart 5) As this Chart shows, from the air our production plants look like a cross-section of American industry. Once on the inside one begins to see the extent and diversity of their capabilities.

[Deleted.]

(Chart 9) The research and development facilities are diverse and capable, dealing as they must with all aspects of the physical world, from the extreme temperatures and accelerations many weapons must withstand to the special environments peculiar to nuclear weapons.

(Chart 10) Here you see part of the computer complex at the Lawrence Livermore National Laboratory. Our laboratory computational capabilities represent a unique national asset.

(Chart 11) This is the Particle Beam Fusion Accelerator at Sandia, [deleted].

(Chart 12) This is a high explosive experiment at the Los Alamos PHERMEX facility in preparation for an underground nuclear test at the Nevada Test Site.

(Chart 13) Testing involves a wide varity of activities but the centerpiece is the full-scale nuclear testing operation in Nevada about one hundred miles northwest of Las Vegas.

(Chart 14) These cables go down hole to the test device and route diagnostic signals to a vast array of equipment contained in these trailers. Tests today are more complex and costly than their predecessors -- but they return more data and hence more knowledge.

(Chart 15) The actual test device is contained in the large canister you see being lowered down hole. In many ways the testing operation resembles the heavy construction industry as much as a high technology data acquisition effort.

## WEAPON PRODUCTION PROGRAMS

(Chart 16) The people and equipment which are the primary assets of our endeavor have produced and are continuing to produce a line of products that is second to none. Some twelve systems will be in production or development through FY 1983 in four different mission categories.

## STRATEGIC WEAPONS

(Chart 17) First, I'll discuss the strategic systems.

The W76 warhead for the TRIDENT missile is in production

[Deleted.]

The W78 is an improved warhead for the MINUTEMAN III ICBM system.

[Deleted.]

We now have a Phase 3 request for an M-X warhead.

[Deleted] An IOC of 1986 has been requested by the DOD.

[Deleted.]

The B83, [deleted]. is a modern high-yield bomb.

[Deleted.]

LONG-RANGE THEATER NUCLEAR SYSTEMS

(Chart 18) Turning now to the long-range theater nuclear systems, we have one bomb and two warhead programs underway.

The W84 warhead is in production engineering for the ground launched cruise missile.

*DELETED*

The W85 is in production engineering as a warhead for the PERSHING II Ballistic Missile system.

*DELETED*

The B61 is a modern tactical bomb currently being produced in two versions

*DELETED*

## BATTLEFIELD NUCLEAR SYSTEMS

(Chart 19) There is also an ongoing effort to upgrade the shorter range tactical systems. An improved LANCE warhead and two artillery shells are currently being developed.

The W70 is a modernized warhead for the LANCE missile. It is one of the warheads with the reduced blast/enhanced radiation feature. *DELETED*

The W79, which was first delivered in FY 1981, is a replacement warhead for the existing W33 8-inch artillery fired atomic projectile.

*DELETED*

The W82 is in development engineering as a replacement for the W48 155mm artillery fired atomic projectile.

[Deleted.]

## FLEET AIR DEFENSE

(Chart 20) There is one Fleet Air Defense warhead in development. The W81 provides a nuclear warhead for the Navy's SM-2 missile for defense against nuclear-armed air, surface, and submarine launched cruise missile threats.

*DELETED*

## WEAPONS RESEARCH EFFORTS

Now let me turn to the research, development and testing work, the foundation for our future weapon systems.

[Deleted.]

## INERTIAL CONFINEMENT FUSION

(Chart 23) We have structured the Inertial Confinement Fusion program so that the three lead laboratories have technical responsibility for the three main driver approaches and for ensuring that inertial confinement fusion activities support the overall nuclear weapons research, development, and testing effort.

*DELETED*

(Chart 25) The concept is that the laser or particle beam will deliver sufficient energy on the target to cause fusion and consequent energy release.

Our current task in Inertial Confinement Fusion is to work toward pellet ignition and significant thermonuclear burn in optimized targets using the large laser and particle beam machines now being built. The Antares $CO_2$ laser facility at LANL will be completed and operating by FY 1984. The PBFA II accelerator at Sandia, Albuquerque will be completed in FY 1986, as will the NOVA glass laser at the Livermore Laboratory in FY 1985.

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(Chart 30) The key to productivity gains is the aggressive pursuit of high leverage innovations such as computer-assisted design and manufacturing (CAD/CAM). With CAD, design changes can be developed and analyzed in much less time. Coupled with an interactive graphics system (IGS), CAD permits dissemination of design changes throughout the entire complex on a time-scale unapproachable with current methods. The explosive development of electronics has resulted in new horizons in CAM as well. Digital, numerically controlled machines offer extreme flexibility and quality in production operations. The incorporation of robotics in industrial practice is featured in high-productivity nations, such as Japan, and is being initiated in the U.S. Investment in innovations such as CAD/CAM and robotics today will result in significant productivity gains and cost benefits in the future.

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We are planning balanced and appropriate initiatives to pursue these efforts to maximum advantage as they become realizable. Specifically, I call your attention to a $12 million line item in construction for an Interactive Graphics System which will support a significant first step in implementing an integrated CAD/CAM system. This project was authorized in FY 1982; but, thus far, no funds have been appropriated.

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(Chart 31) This Chart shows a conventional manually-operated lathe.

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(Chart 32) Here you see a replacement lathe which is computer controlled. This new machine has been responsible for a 30% reduction in machining time.

(Chart 33) The first replacement lathe was installed in March 1981

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The dramatic reductions in total machine requirements will permit procurement of fewer machines over the next 2-3 years to meet the projected workload.

The economic payback period on the new machines is expected to be less than 2-1/2 years, based on a ten-shift-per-week operation.

(Chart 34) In the next example three older mills with very limited capabilities

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(Chart 35) This new four-axis mill has replaced the three mills just shown.

(Chart 36) DELETED capabilities have been regained with acquisition of the new equipment and productivity gains are being experienced.

While these are just two examples, and much other progress has been made, I do not want to give you the impression that things are "just fine" and we can relax. There is still much to be done to provide for future needs.

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## FY 1983 BUDGET REQUEST

(Chart 39) This Chart gives an overall view of the amended FY 1983 request for weapons activities which totals approximately $3.5 billion. About $153 million of that sum is devoted to the inertial confinement fusion program. Note that in all other areas requested increases provide for program growth in keeping with our need to address the issues I have just discussed.

## REQUEST FOR OPERATING FUNDS

(Chart 40) The production and surveillance operating budget of about $1.6 billion includes funds requested for our seven plants that manufacture components and assemble nuclear weapons.

The funds provide for production of new war reserve weapons; lifetime surveillance and maintenance of the weapons stockpile; process development to prepare for new designs and improve technology; the retirement of warheads, and a stockpile improvement program to modernize certain older weapons currently in the United States nuclear stockpile.

(Chart 41) With regard to the research, development and testing program, the FY 1983 request for operating funds is just under \$1.1 billion, \$649.6 million for research and development and \$425.4 million for testing. The FY 1982 Supplemental request is \$15.0 million, necessary to maintain employment levels at the laboratories and the test site.

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(Chart 42) The requested inertial fusion operating funds for FY 1983 amount to \$122 million.

Funding for Program Direction is the final element in our operating request. The amount of \$51.3 million is requested in FY 1983, for salary, benefits and travel expense of the 927 Federal employees associated with the technical direction and management of the weapons program. Approximately \$10 million is for the Community Assistance Program at Los Alamos and Oak Ridge. Also included is the funding for the contractual services and supplies necessary to support the Albuquerque and Nevada Operations Offices.

## CAPITAL EQUIPMENT BUDGET REQUEST

(Chart 43) Our total capital equipment request, including computers and Inertial Fusion, comes to \$201 million. Included in this request is \$ 19.5 million for the purchase of laboratory and production complex computer equipment.

## CONSTRUCTION BUDGET REQUEST

(Chart 44) Our total construction program, including Inertial Fusion, comes to almost $494 million. Included in this request is funding for general plant projects and two new weapons system projects as well as funding for fourteen prior year construction projects. The amended construction request for Inertial Fusion is $19.8 million for continuation of the 10 beam NOVA project and the Particle Beam Fusion Accelerator II.

## VERIFICATION AND CONTROL TECHNOLOGY

Now, Mr. Chairman, I would like to discuss our Verification and Control Technology Program.

(Chart 45) This program has four specific goals:

- To provide the technology and equipment necessary to monitor foreign nuclear explosions conducted underground, in the atmosphere and in space, and to monitor compliance with nuclear weapons-related treaties.

- To control proposed exports of nuclear and energy-related materials, equipment and technology to ensure they are consistent with U.S. national security and with nonproliferation policy.

- To provide technical and analytical support for the Agency's role in nuclear arms control negotiations, policy formulation and implementation.

- To provide Defense Programs' unique weapons and nuclear-related expertise to the Intelligence Community.

Activities within the Verification and Control Technology program fall into two functional categories -- detection technology and analytical support, both of which draw upon the unique expertise, skills and resources of the national nuclear weapons laboratories.

## DETECTION TECHNOLOGY

The detection technology component of the program encompasses a wide range of technologies -- spaceborne sensors, seismic, nonseismic, debris detection and sample analysis, and on-site monitoring.

## SPACEBORNE SENSORS

(Chart 46) The overall purpose of our space effort is to develop and maintain U.S. capability to detect and characterize nuclear explosions from spaceborne platforms. The effort includes research and development, the actual fabrication of sensor packages, and operational support, which provides for integration of sensor subsystems with launch platforms, for calibration and testing of subsystems, and evaluation and analysis of data collection, processing and exploitation.

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## SEISMIC DETECTION

(Chart 47) The aim of the seismic detection program is to determine the effectiveness of regional -- that is, short-range -- seismic signals for monitoring compliance with nuclear test ban treaties. Such regional seismic monitoring would augment teleseismic -- that is, long-range -- monitoring as a verification tool.

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In FY 1982 we are completing establishment of a Regional Seismic Test Network as a model to learn how an in-country system might function. The regional network is composed of five seismic stations -- three in the United States and two in Canada -- linked via satellite to a control point in Albuquerque, New Mexico. During FY 1983, which will be its first full year of operation, the Regional Seismic Test Network will gather seismic data which will be analyzed to determine our capabilities to discriminate between seismic signals generated by earthquakes and those generated by explosions.

## NONSEISMIC DETECTION

(Chart 48) The nonseismic detection program is a research and development effort aimed at determining whether certain atmospheric phenomena can be reliable indicators of underground nuclear explosions. The nonseismic program has two main components -- infrasonic monitoring and ionospheric monitoring. In infrasonic monitoring we try to detect and measure very low frequency sound waves to determine if it is possible to detect underground explosions acoustically. In ionospheric monitoring we try to detect and measure perturbations of the upper atmosphere caused by underground explosions. FY 1983 efforts will continue a long-term earthquake monitoring effort to determine the potential for distinguishing between ionospheric phenomena generated by "false alarms" such as earthquakes and those generated by underground explosions.

## DEBRIS DETECTION AND SAMPLE ANALYSIS

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## ON-SITE MONITORING

(Chart 50) The Peaceful Nuclear Explosions Treaty, which along with the Threshold Test Ban Treaty awaits Senate advice and consent to ratification, provides for the United States and the Soviet Union to conduct observations and examinations on each other's territories for certain peaceful nuclear explosions, minimizing any military benefits otherwise banned. This on-site monitoring provision is important in arms control agreements with the Soviet Union, and the United States hopes that someday the on-site principle will be widely applied.

The Verification and Control Technology program has developed the necessary equipment and has designated Defense Programs personnel with the necessary skills, to fulfill our responsibilities.

## ANALYTICAL SUPPORT

Analytical support activities fulfill our responsibilities in export control, technology transfer, international scientific exchange, arms control, weapons intelligence and proliferation intelligence. These activities marshal the expertise, data and analysis to take part in negotiating and implementing arms control and other agreements, to meet national needs in understanding foreign nuclear weapons programs and nuclear proliferation, and to control the export of weapons-related materials and equipment and the transfer of related technology.

In the export control area, it is our responsibility to review proposed nuclear and energy-related exports and technology transfers, and international cooperation and exchange agreements. This enables senior management to meet its statutory responsiblity of assuring that these activities are consistent with U.S. national security and nonproliferation policy.

Because of the unique experience and resources of the U.S. nuclear weapons complex, we also are called upon to support the Department of Defense in identifying militarily critical technologies and to support the Departments of State and Commerce in carrying out their important responsibilities for controlling U.S. exports and international cooperation and exchanges.

We have been and will continue to be deeply involved in the implementation of a Presidential directive to seek agreement with other nuclear supplier countries on the conditions that should be applied to sensitive nuclear exports.

Defense Programs' responsibility for the U.S. nuclear weapons program makes essential its participation in the arms control process. Verification and Control Technology has responsibility for Defense Programs in the arms control arena, participating in the U.N. Committee on Disarmament and bilateral and trilateral negotiations on possible nuclear test limitation agreements, participating in the interagency backstopping committees supporting negotiations, and arranging for weapons laboratories scientists to provide technical representation. We also particpate in the interagency working group that prepares annual Arms Control Impact Statements on nuclear weapon activities.

*DELETED* the Intelligence Community traditionally has turned to the nuclear weapons laboratories for expertise in analyzing information on foreign nuclear weapons, especially Soviet weapons. The fundamental purpose is to provide a sound technical basis for the Intelligence Community's assessment of the Soviet threat. An additional purpose is to assess consequences of nuclear test limitations and their possible asymmetrical impact on U.S. and Soviet nuclear weapons programs.

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In response to the Atomic Energy Act, the Nuclear Non-Proliferations Act, and other laws and to Presidential and Director of Central Intelligence directives, we assist the Intelligence Community in analyzing collected information and produce assessments of the nuclear activities, technical capabilities and motives of possible proliferant countries.

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## BUDGET REQUEST

(Chart 51) The Verification and Control Technology request for FY 1983 is $52.4 million for operating expenses and $1.5 million for capital equipment. Our FY 1982 supplemental request of $2.0 million is needed to maintain the schedule for delivery of a new spaceborne detection instrument package. The increase of $1.9 million over FY 1982 is mainly associated with the requirements for spaceborne nuclear explosion detection systems.

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Capital equipment expenditures support research, development, test and production activities through the provision of test equipment and instrumentation related to the total program. There is a continuing need to update test equipment at the Sandia National Laboratories, the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory. Most equipment is small scale bench test equipment such as oscilloscopes, electronic calibration devices and small scale electronic support devices.

Program direction funds provide for the salaries, benefits, and travel expenses for 37 FTE's associated with the management and direction of this program at the Headquarters facility located in Washington, D.C. The requested funding of $1.8

million provides for full year staff support, employees advancement and normal administrative cost. These employees are responsible for technical and analytical program management of field activities, and execution of Headquarters staff functions.

## SAFEGUARDS AND SECURITY

(Chart 52) Now, I will turn to the Nuclear Materials Security and Safeguards program. The primary mission of the Agency's activities in this area is the protection of classified information and nuclear weapons, materials and facilities against theft and sabotage. This mission is accomplished through development and implementation of policies and procedures, as well as development and application of components and systems, for assuring such protection. The program also focuses on providing safeguards technical support to United States and international activities to minimize the proliferation of nuclear weapons.

The Nuclear Materials Security and Safeguards program encompasses both operational and developmental activities. The former includes such safeguards and security operations as the Nuclear Materials Management and Safeguards System, which is our master U.S. nuclear material tracking information system; the New Brunswick Laboratory; and the validation of guard training requirements. Developmental activities in enhancing safeguards and security are carried out largely by the national laboratories and the resulting improvements are then transferred to Agency operations. I should point out that this program does not fund the actual plant, capital equipment, and operating expenses of Agency-wide safeguards and security systems at Agency facilities.

## NUCLEAR MATERIALS SECURITY AND SAFEGUARDS

(Chart 53) The Nuclear Materials Security and Safeguards program consists of six basic elements. These are: security operations, safeguards operations, international safeguards, technology development, classification, and program direction.

## SECURITY OPERATIONS

The Security Operations element of our program provides guidance and direction for the Agency's capabilities to protect classified information and material. Present activities include emphasis in the areas of understanding the potential threats, vulnerabilities and related consequences to our resources and ensuring protective force readiness to deal with adversary challenges. Through the Security Operations program, valuable counterintelligence information related to the foreign intelligence threat is analyzed and disseminated to appropriate Agency components. Additional efforts emphasize computer security and other technical security activities. New standards and related training programs are being established for the Agency's protective forces. The Multiple Integrated Laser Engagement System (MILES), which uses weapons modified to shoot harmless laser beams instead of ammunition, is being used extensively in the guard force tactical training program.

## SAFEGUARDS OPERATIONS

I will now turn to Safeguards Operations which involves three major functions: technical safeguards assistance to Agency field operations, the nuclear material control and accountability program which includes the Nuclear Materials Management and Safeguards System, and operation of the New Brunswick Laboratory at Argonne, Illinois.

A high priority effort in our program is providing expert technical assistance to Agency facility managers. This assistance supports application of the latest state-of-the-art safeguards and security equipment and integrated systems. Areas for improvement have been identified through on-site inspections, vulnerability assessments, and field office requests. Site-specific assistance for identified improvements to weapons and nuclear materials production program facilities is planned for a number of sites.

The Nuclear Materials Management and Safeguards System is the sole national nuclear materials computerized data base for tracking the status and location of nuclear materials in the U.S. It serves the Nuclear Regulatory Commission (NRC) as well as this Agency. The system receives and processes information on 18 types of nuclear materials owned and used by this and other government agencies, as well as nuclear materials leased to or owned by private companies in the U.S.

Heightened concern over the "insider threat" has sparked the need for reexamination of the role of material control and accountabilty to ensure timely detection of material diversion. Material control and accountability activities planned or in progress include the development of standard statistical techniques to evaluate inventory differences at Agency facilities.

This program supports the New Brunswick Laboratory which serves the Agency's nuclear contractors, NRC licensed facilities and the international community. This is the principal U.S. laboratory for nuclear material measurements and standards and inventory verification of safeguards inspectors' samples.

I mentioned in my preliminary remarks the Agency-wide budget for safeguards and security. Our function in that specific area is to work closely with the field and program offices in identifying and analyzing deficiencies in safeguards and security systems, and in coordinating followup actions to assure that proper remedial actions are taken in response to these identified deficiencies.

## INTERNATIONAL SAFEGUARDS

In the area of International Safeguards, the primary objective is to support U.S. nonproliferation and national security objectives. This program is directly responsible for the development of international safeguards systems required for facilities in the United States that may become eligible for International Atomic Energy Agency (IAEA) safeguards inspections under the recently enacted treaty between the United States and the IAEA, the so-called "Voluntary Offer".

Another major effort concerns direct support to the International Atomic Energy Agency. The program includes management of a U.S.-funded Program of Technical Assistance to the IAEA in response to urgent requirements identified by the IAEA. Also, much of the technology which we develop for domestic application is transferred selectively to the IAEA to assist it in meeting its objectives of effectively safeguarding nuclear materials and facilities world-wide.

## TECHNOLOGY DEVELOPMENT

Research and development is conducted on a range of components and systems for physical protection and material control and accountability. Efforts focus on developing components to solve identified deficiencies and provide performance specifications for equipment to be used at existing Agency facilities or new facilities in the design stage.

In the past several years, funding emphasis has been shifted from technology development to current operational problems. Equipment to identify and allow access of only authorized personnel, as well as to prevent entry of contraband, will be evaluated in operational environments at one or more Agency facilities. A broadened base of capability for measuring uranium and plutonium materials will be pursued to reflect the increasing need and benefits of automated, remote measurements in safeguarding materials.

## CLASSIFICATION

The Agency's classification function is under my direction. Formerly, this activity was funded under the Agency's Departmental Administration Appropriation. This year, for the first time, funds are being requested for this work as part of the Atomic Energy Defense Activities Appropriation, in the Nuclear Materials Security and Safeguards program.

The objectives of the program are to establish and implement policy for the classification of Restricted Data, Formerly Restricted Data, and National Security Information within the Agency's jurisdiction in accordance with the requirements of the Atomic Energy Act of 1954, as amended, and applicable Executive Orders. The program must also assure the continuous review of Restricted Data in order to determine what may be declassified and disseminated in the interest of scientific and technical progress and the general welfare, without damage to the national security.

Specifically, the Classification program (1) provides continuing guidance to Headquarters and field organizations on classification and declassification policies and procedures; (2) develops and updates classification guidance for nuclear weapons and other classified areas; (3) handles classification and declassification reviews, such as Freedom of Information Act requests, and Mandatory Review Requests pursuant to Executive Order 12356; and (4) performs appraisals of field office and contractor classification functions.

In compliance with Congressional, General Accounting Office and Inspector General commitments, a comprehensive Classification Review Program rereview project will continue in FY 1983.

## PROGRAM DIRECTION

Our FY 1983 budget request includes program administration supporting a total of 139 positions, including 33 for the classification program. It should be observed that many of the functions necessary for the successful fulfillment of these responsibilities are headquarters/personnel intensive. For example, a substantial portion of this program's staff is involved in providing security support and in the processing and analysis of over 25,000 security investigations per year.

## PLANT AND CAPITAL EQUIPMENT

Our budget request for Nuclear Materials Security and Safeguards contains a modest amount for capital equipment required to support the safeguards and security program I have described. It also includes a general plant project at the New Brunswick Laboratory for the plutonium handling operation that requires alterations for health and safety improvements including modification and upgrade of the exhaust scrubber system and modification and replacement of deteriorating ventilation duct work.

## SECURITY INVESTIGATIONS

(Chart 54) I will now address the Security Investigations Program. The amended FY 1983 budget request for Security Investigations is $28.5 million. These funds are used to reimburse the Federal Bureau of Investigation (FBI) and the Office of Personnel Management (OPM) for conducting background investigations on Agency employees, contractor employees, and consultants prior to their being granted access to classified information, classified materials, or special nuclear materials. The background investigation is required by the Atomic Energy Act of 1954, as amended, and by Executive Order 10450 to insure that access to classified information, classified material, or special nuclear material will not endanger the national security.

The FY 1983 budget provides for approximately 18,200 background investigations and 10,800 national agency checks. The majority of background investigations support defense activities but are also required for personnel in the uranium enrichment program, and nuclear energy research and development programs.

Although costs for the investigations have risen substantially over the past few years, we have completed a high percentage of the clearances required by the Agency programs.

## BUDGET REQUEST

(Chart 55) In summary, Mr. Chairman, we are requesting appropriation of $47.4 million for the Nuclear Materials Security and Safeguards Program and $28.5 million for the Security Investigations Program.

Now, Mr. Chairman, I will turn to the Nuclear Materials Production Program.

## NUCLEAR MATERIALS PRODUCTION

(Chart 56) The Materials Production program is responsible for the production of nuclear materials primarily for use in military programs, but also for use in government research and development programs such as the breeder reactor, and civilian programs which use radioisotopes in medical, research and commercial applications. Almost all of these materials are produced in nuclear reactors dedicated to this production effort.

(Chart 57) To accomplish this, we operate major facilities at several sites, including the production reactor feed plants at Fernald and Ashtabula, Ohio, and Oak Ridge, Tennessee; the N Reactor, a fuel fabrication plant, a chemical processing plant, and other support facilities at Richland, Washington; three nuclear materials production reactors, two chemical processing plants, a fuel fabrication plant, and other support facilities at Savannah River, South Carolina; and a chemical processing plant and support facilities at Idaho Falls, Idaho. Operations at Idaho include receipt, storage, and processing of fuels both from Navy propulsion reactors and government and civilian test reactors for recovery and reuse of the remaining enriched uranium.

## PRODUCTION PROCESS AND MATERIAL FLOW

(Chart 58) The basic nuclear process for producing plutonium-239 is the capture of a neutron by uranium-238 in a nuclear materials production reactor to give uranium of atomic weight 239 which decays to plutonium-239, within a few days, by electron emission. (Chart 59) The fundamental method for producing tritium, hydrogen-3, in a reactor is the capture of a neutron by lithium-6 which decomposes to give tritium and helium as a byproduct.

(Chart 60) The defense nuclear fuel cycle is as depicted on this chart. The enriched uranium to fuel our reactors comes from three sources: (1) uranium recovered from the spent fuel itself after it has been burned in the production reactors; (2) spent Navy and R&D reactor fuel processed at Idaho or Savannah River; and (3) inventory. The uranium is blended to the proper enrichment at Oak Ridge and shipped to Savannah River and Richland where it is fabricated into fuel rods for insertion into the reactors.

The Savannah River reactors use about 60 percent enriched uranium in the fuel to drive the reactors with physically separate depleted uranium target slugs in which plutonium is bred. The fuel rods as well as the target rods are processed at Savannah River to recover the uranium and the plutonium. Tritium is produced at Savannah River by lithium loaded target rods which can be placed in the reactor in lieu of the depleted uranium rods.

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The N Reactor at Richland uses slightly-enriched uranium fuel containing about 1 percent fissile uranium-235 to power the reactor and about 99 percent uranium-238 to produce plutonium. The spent fuel from N Reactor is now being stored in water basins at the reactor site pending restart of the PUREX fuel processing plant at Hanford. The plant is scheduled for April 1984 restart, but the amended FY 1983 request will permit advancing that startup date by as much as six months.

## SITE DESCRIPTIONS

(Chart 61) This is a map of the Savannah River Plant site. The 192,000 acre site is spread over parts of three South Carolina counties and is 12 miles south of the City of Aiken and 15 miles southeast of the City of Augusta, Georgia. The plant is operated by the DuPont Company. Major facilities at Savannah River include three operating reactors, two processing canyons, the Savannah River Laboratory, two standby reactors -- L and R -- and administrative and support facilities. L Reactor is currently being upgraded for restart in FY 1984. (Chart 62) This is a picture of the C Reactor and its support facilities. The ponds in the foreground provide cooling water for the facility during operation.

(Chart 63) This slide provides a schematic representation of a Savannah River reactor. Most of the structure is below ground and inaccessible for maintenance during reactor operation because of radioactivity levels. The reactor consists of a large shielded stainless steel tank filled with heavy water moderator to slow down the neutrons. Inserted into the heavy water are more than 600 fuel and target elements in specified configurations. Heat generated by nuclear fission is removed by circulating heavy water coolant in a closed loop through the fuel and target elements, through heat exchangers, and back into the reactor. The heat exchangers are cooled by river water which is discharged back to the environment via on-site ponds and streams.

(Chart 64) This is a picture of a Savannah River chemical processing plant which we call a canyon. Plutonium processing is a chemical separations activity where the targets are dissolved and the uranium and plutonium extracted through solvent extraction techniques. The recovered plutonium is put in the form of metal metal buttons which are then shipped to the weapons plants for fabrication into weapon components. (Chart 65) This is a view of a canyon interior. The interior of the canyon is not accessible to personnel. The picture was taken during initial construction and installation of equipment about 25 years ago. All equipment removals and installations are done remotely through the use of a shielded crane. Above the canyon is a crane with a shielded cab to protect the operator from exposure to radiation. The operator uses a periscope to perform his operations.

(Chart 66) Production operations at the Hanford site near Richland, Washington, are primarily conducted by two contractors: United Nuclear Corporation fabricates fuel for N Reactor and is responsible for reactor operation, maintenance, engineering and development; and Rockwell Hanford Operations provides support facilities for the entire site and will be responsible for operation of the PUREX fuel processing plant. Major Materials Production facilities at the site include the N Reactor, the PUREX Fuel Processing Facility, the Plutonium Finishing Plant (Z-Plant), the N Reactor fuel fabrication facility, and miscellaneous support facilities.

(Chart 67) This is a picture of the N Reactor located at Richland, Washington. The N Reactor produces *DELETED* plutonium *DELETED* and delivers by-product steam to the Washington Public Power Supply System to generate up to 4 billion kilowatt-hours of electricity for the Bonneville Power Administration power grid. The estimated revenue for fiscal year 1983 of $38.0 million for steam will go to the U.S. Treasury. These revenues are not included in our budget. This reactor will be fully converted from production of fuel-grade to weapon-grade plutonium in 1983 utilizing funds contained in the FY 1982 supplemental and FY 1983 amendment requests.

(Chart 68) This is a picture of the PUREX Fuel Processing Plant at Richland, Washington. This plant is currently in standby condition. The FY 1983 budget request includes third year funding to continue reactivation of this plant and its supporting facilities at Richland.

(Chart 69) Our major Nuclear Materials Production facilities at the Idaho National Engineering Laboratory site are the Idaho Fuels Processing Facility, which contains the Rover Fuel Processing Facility, the Fluorinel Dissolution Process Facility, and miscellaneous support and analytical facilities, all of which are part of the Idaho Chemical Processing Plant and are operated by Exxon Nuclear Corporation.

(Chart 70) This is a picture of the Idaho Fuels Processing Facility. The primary mission of this facility is to process spent fuel received from Navy nuclear vessels. The recovered enriched uranium is recycled as fuel into the Savannah River reactors for their operation. The Idaho Fuels Processing Facility also processes fuels from research and development and other reactors.

## NUCLEAR MATERIALS REQUIREMENTS

(Chart 71) The Agency's tritium and plutonium production commitment is primarily to fulfill the projection of the U.S. nuclear weapons requirements as reflected in the Nuclear Weapons Stockpile Memorandum submitted to the President annually for approval. The FY 1983 Stockpile Memorandum was signed by President Reagan on March 17, 1982. This memorandum contains stockpile projections for planning purposes through FY 1997. As I mentioned earlier, our program is designed to meet the requirements of this new Stockpile Memorandum, and our FY 1983 Appropriations request together with the FY 1982 Supplemental request and the FY 1983 Budget Amendment before you are all needed to carry out the program I am about to discuss with you.

Most of the nuclear materials required for building new warheads are obtained by reclaiming and recycling existing materials from retired weapons returned by the Department of Defense. However, weapon requirements which cannot be met from Department of Defense returns or existing agency inventories must be satisfied by new production.

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(Chart 76) This chart summarizes the fuel-grade plutonium supply and demand for the weapon program based on the FY 1983 Nuclear Weapons Stockpile Memorandum. Fuel-grade plutonium is required for blending with higher purity plutonium, and for purification through a special isotope separation facility, to produce more weapon-grade material.

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## PRODUCTION INITIATIVES

Each of these initiatives plays an important role in the production program.

(Chart 77) In FY 1981 Congress authorized and appropriated funds to initiate several new plutonium activities. The new initiatives being vigorously pressed in FY 1982 and continued into FY 1983 include: the Facility Restoration Program to upgrade the nuclear materials production complex; L Reactor upgrade; production of high purity plutonium in the Savannah River reactors for blending with fuel-grade plutonium; Special Isotope Separation research and development; PUREX reactivation; conversion of N Reactor to weapon-grade plutonium production; and a new production reactor. Also in FY 1982 at either Savannah River or Richland, we propose to initiate conceptual engineering for expansion and modification of existing fuel processing capabilities.

## RESTORATION PROGRAM

The Restoration Program is being undertaken to improve the reliability and efficiency of the materials production complex. Much of the production complex has been in continuous use for 25 to 30 years. As a result of aging and use, many facilities, systems, and components have gradually worn out, deteriorated, or become obsolete,

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Initial funds for implementation were provided in FY 1981 and FY 1982. A total of $176.4 million was authorized over these two years and work is currently underway on Phases I and II of the program. In FY 1983 we are requesting funding to continue ongoing activities and to initiate Phase III of the program.

The estimated cost of the nuclear materials production Restoration Program remains unchanged at $420 million in constant year dollars. In deference to budget austerity, the program in FY 1982 is being incrementally funded over a seven year period rather than the five years originally planned. All unfunded subprojects have been reprioritized to assure that those tasks that are most pressing are included in FY 1983. The amended FY 1983 budget provides for return of the Restoration Program to a six year schedule.

Apart from the materials available from retired weapons which meet a great deal of the weapon need, the plants being restored under this program are the only available sources of supply for meeting the demands for nuclear materials for weapons fabrication and energy research and development programs. It is essential that they continue to operate safely and reliably.

## L REACTOR UPGRADE

The L Reactor upgrade program was initiated in FY 1981 and continued in FY 1982. This upgrading is on schedule for completion by October 1983.

Since the L Reactor was shut down in 1968, many capital projects have been undertaken to improve the safety and efficiency of the remaining three operating reactors at Savannah River. These changes will be incorporated into L Reactor to bring it to condition equivalent to that of the operating reactors.

## BLENDING

(Chart 78) The production of high-purity (3% Pu-240) plutonium will be continued in FY 1983 at Savannah River for blending with existing fuel-grade (12% Pu-240) plutonium from Richland. This program, initiated in FY 1981 and continued in FY 1982, provides for the production of feed materials, fabrication of additional targets, and for target storage basin modifications necessary to handle the increased volume of irradiated plutonium targets. Production of high-purity plutonium requires essentially twice the reactor throughput of targets compared to production of weapon-grade plutonium.

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## SPECIAL ISOTOPE SEPARATION

The FY 1983 budget provides for continuation of the Special Isotope Separation (SIS) R&D program for plutonium. This R&D program supports the option of using isotopic enrichment to convert fuel-grade plutonium from existing Government inventories into weapons grade plutonium.

An operational SIS production plant could be available by FY 1989 if the current R&D work proceeds as anticipated. An isotope separation plant also would be able to "clean-up" the existing weapon-grade plutonium stockpile by the removing of undesirable plutonium isotopes Pu-240 and Pu-241 that are the major sources of radiation emanating from plutonium. This would reduce the radiation exposure to Defense Programs and contractor personnel who manufacture or handle nuclear weapons and to the DOD personnel who deploy these weapons.

In addition, a Special Isotope Separation production plant would be cost effective for separating non-fissile isotopes of plutonium such as Pu-238, Pu-240 and Pu-242.

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## PUREX

The FY 1982 Supplemental Request and the FY 1983 budget with its amendment provides for the third year operating funds to speed up the reactivation of the PUREX fuel processing plant and its supporting facilities at Richland, and to allow eventual operation at the plant's full *DELETED* capacity. PUREX reactivation is now scheduled for April 1984, but the FY 1983 amendment request will permit advancing that startup by as much as six months. The plant upgrading includes process cell-by-cell repair, checkout and operability testing of all process systems. Three separate facility and safety assessments and maintenance and operability testing to date indicate that PUREX can safely and reliably begin operations ahead of schedule.

## N REACTOR

The budget provides the third year funding increment for converting the reactor from fuel-grade to weapon-grade plutonium production. N Reactor has already produced some 6 percent plutonium in FY 1982. During FY 1982 using Supplemental funding, the procurement of zirconium for fuel cladding will be accelerated to support the increased fuel fabrication required to continue N Reactor to a weapon-grade mode of operation. The fuel throughput for weapon-grade plutonium production is more than double that to produce fuel-grade plutonium. In FY 1983, the Budget Amendment will allow application of further increased production options such as production of 5% Pu-240 plutonium and/or operation at higher power, both of which will result in the increased production we need.

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## NEW PRODUCTION REACTOR

The current budget includes detailed site studies in FY 1982. Efforts planned for FY 1983 include contractor(s) selection, initiation of functional design and analysis, conceptual design, and environmental assessments on an accelerated basis. These activities could lead to Title I design in FY 1984, start construction in FY 1985, and production operation in FY 1992.

The New Production Reactor would produce reactor products for national defense; one important product is tritium. The cessation of tritium production would have an adverse impact on our total stockpile yield.

## EXPANSION AND MODIFICATION OF EXISTING FUELS PROCESSING FACILITY

Existing fuel processing facilities do not have capability for recovering plutonium from specially clad nonproduction fuels, i.e., certain spent fuels from research and test reactors. Substantial quantities of nonproduction reactor fuel exist, such as FFTF fuel. A processing capability in the late 1980's for these spent fuels will permit this valuable material to be recovered and reused. Conceptual design of a facility, enabling one of the defense processing facilities to handle nonproduction fuels, will be initiated in FY 1982 with supplemental funding. The facility would be located adjacent to existing processing facilities, either at Richland or Savannah River. The plutonium recovered from processing nonproduction but government-owned reactor fuel would be used as a source for future weapons program requirements or to meet breeder program needs.

## FY 1981 ACCOMPLISHMENTS

Program accomplishments during FY 1981 include the following. We produced the required plutonium and tritium for national defense at levels exceeding our FY 1981 plan. We began new initiatives to increase production of nuclear materials by converting one Savannah River reactor to tritium production *DELETED* converting two Savannah River River reactors to high purity plutonium production for blending; initiating materials production complex restoration; beginning L Reactor upgrade for restart; beginning reactivation of the PUREX fuel processing plant; and beginning conversion of N Reactor to weapon-grade plutonium production. We operated the nuclear materials production complex in a safe, secure and environmentally sound manner. We supplied byproduct nuclear isotopes for R&D and commercial requirements, for example, tritium, americium-241, and krypton-85.

## FY 1982 PLANNED ACTIVITIES

Our planned activities for FY 1982 include the following. We will produce the planned quantities of plutonium, tritium, and other nuclear materials for national security, other Agency R&D programs, and commercial applications.

*DELETED*

The initiatives begun in FY 1981 to increase the production of nuclear materials will be continued. Research and development supporting the use of high productivity cores at Savannah River will be completed. Our nuclear materials production complex will be operated safely, efficiently, and in compliance with environmental regulation.

## BUDGET REQUEST

(Chart 79) Our FY 1983 amended budget request of about $1.2 billion for the Materials Production program includes $848 million for operating expenses, $108 million for capital equipment, and $273 million for construction, $49 million of which is for new construction projects. The FY 1982 Supplemental Request I have mentioned inlcudes $36.5 million for this program.

(Chart 80 and 81) These charts list the individual construction projects included in our request.

Now I would like to turn to the Defense Nuclear Waste Management program.

## DEFENSE NUCLEAR WASTE AND BYPRODUCTS MANAGEMENT

The Defense Nuclear Waste and Byproducts Management program provides for the management of radioactive wastes, generated primarily by the defense activities of the Agency, in particular nuclear material production and weapon production. It also includes research and development of technologies for the disposal of these wastes and beneficial applications of recovered materials.

(Chart 82) The primary goal of the program is to utilize, or dispose of, nuclear wastes routinely, safely, and effectively. This goal will be achieved when there is no need to add to the inventories of stored waste for lack of a disposal system.

The second goal is to deal with the inventory of wastes and facilities from the past. This goal will be achieved when the inventory is reduced to normal operational levels and the backlog dealt with for the long-term, either by immobilization and disposal or by stabilization in place.

The inventory of defense wastes and their relative amounts are shown in Chart 83. As you will note, the largest inventory of waste is low level for which the fuel cycle is closed through shallow-land burial. We are addressing the long term solution for high level and transuranic waste. Chart 84 shows the location of high-level wastes stored in tanks and bins. Although Richland has the greatest volume of waste, there is more radioactivity at Savannah River because we are producting new waste there. Chart 85 shows the location of stored and buried transuranic wastes. Again, Richland has the greatest volume of waste, but Idaho's waste has about the same content of radioactive material and the largest volume of stored waste.

## INTERIM WASTE OPERATIONS

In meeting our responsibilities for providing safe handling and interim storage or disposal of radioactive byproducts and waste resulting from defense activities, the Interim Waste Operations activity has achieved several major accomplishments. Specifically, by the end of FY 1981, the free-standing liquid had been pumped out of all 149 single-shell tanks at the Hanford Site at Richland, Washington, significantly decreasing the potential for leaks from these tanks (Chart 86); seven new double-shell tanks at Hanford were put into operation, providing additional waste storage capability; and 14 single-shell tanks at Hanford had been isolated to prevent the intrusion of liquid. In addition, construction of the New Waste Calcining Facility and the fifth set of calcined solids storage bins at the Idaho National Engineering Laboratory were completed.

So far in FY 1982, we have completed the construction of the New Hydrofracture Facility at Oak Ridge, Tennessee, which will be used to inject a mixture (Chart 87) of intermediate-level waste and cement into the shale formation underlying

Oak Ridge National Laboratory, and we have completed 18 new double-shell tanks at Savannah River, South Carolina, which are needed to complete the program for transfer of waste from the older tanks. In the remaining months of FY 1982, we will begin hot operations of the New Hydrofracture Facility at Oak Ridge and the New Waste Calcining Facility at Idaho.

In 1983, Interim Waste Operations activities which support the Waste Isolation Pilot Plant project and the Defense Waste Processing Facility will become more prominent in our program. Specifically, we will begin developing procedures at all sites to certify newly generated transuranic waste as being acceptable for emplacement at the Waste Isolation Pilot Plant in New Mexico. Waste in retrievable storage will also be addressed at some of the storage sites in 1983. Efforts will continue to develop the processing design, construction and equipment installation for transferring high-level waste from old single-shell tanks to new double-shell tanks at Savannah River. In addition, at Savannah River we will demonstrate an in-tank precipitation process for the removal of cesium from the salt. If successful, this byproduct will be available for subsequent use, eliminating the need for a second stage of the Defense Waste Processing Facility, and greatly reducing future costs. At Hanford, we will begin the construction of six double-shell tanks for high-level waste and will increase waste evaporator operations as included in the Suplemental and Budget Amendment requests to prepare for the startup of the PUREX fuel reprocessing plant in fiscal year 1984. We will also continue efforts at Hanford to stabilize and isolate the old single-shell tanks and transfer waste to new double-shell tanks.

Under our landlord responsibilities, we will continue efforts begun in fiscal year 1981 at Hanford to restore general support facilities and equipment to an acceptable level of safety, reliability, and efficiency. With the transfer of Idaho landlord to Defense Waste Management in fiscal year 1983, we are supporting general site support efforts there also.

## DECONTAMINATION AND DECOMMISSIONING

We have responsibility for the decontamination and decommissioning of about 400 (Chart 88) surplus defense facilities including reactors, reprocessing plants and waste facilities. The locations of these facilities are shown on this map (Chart 89). We have reoriented this program for FY 1983. As in the past, all facilities will be maintained in an occupationally and environmentally safe condition. Where it is determined to be cost effective, program priorities in FY 1983 will also stress beneficial reuse of existing structures and recovery of valuable materials while reducing future maintenance costs.

In FY 1982, only a minimal program of surveillance and maintenance will be provided. The increased funding in FY 1983 will provide an adequate level of maintenance and surveillance for all defense-related surplus facilities and permit the implementation of beneficial reuse programs at Hanford, the Mound Facility, the New Brunswick Laboratory Site, and the Idaho site.

## LONG-TERM WASTE MANAGEMENT TECHNOLOGY

The goal of this technology program is to define, evaluate, and implement solutions for the long-term management and disposal of the Agency's defense-related radioactive wastes and for the utilization of waste byproducts. Major considerations in the selection and implementation of these alternatives include the impact to public health and the environment, and overall costs. We are preparing a defense waste plan in response to Section 213 of the 1982 Authorization Act, P.L. 97-90. This plan, which will cover our long-term strategy for each site, will be forwarded to Congress in June 1983 by the President.

In order to decentralize management in this area, we have established lead field offices (Chart 90), supported by lead contractors, with responsibility for the technology program associated with each type of radioactive waste. These organizations provide overall planning, direction, and assessment of technology development.

## HIGH-LEVEL WASTE

In the High-Level Waste Technology program, we are developing the technology required for long-term management of defense high-level waste at the individual Agency sites. The program now is focusing on implementation of the selected waste processing strategy at Savannah River, while continuing development of options appropriate for the wastes at Richland and the Idaho sites.

During FY 1982 the number of alternative waste forms being evaluated for the DWPF at Savannah River has been reduced from seven to two (Chart 91): the reference form, which is borosilicate glass, and a crystalline-ceramic form. We expect to select a final waste form during FY 1982.

During FY 1983, the High-Level Waste program will focus on the technology required for the Defense Waste Processing Facility design and construction at Savannah River (Chart 92). Full scale tests will be performed using simulated waste to demonstrate the reliability of the glass-melter and support systems, including slurry feed transfer, off-gas and process controls. Testing of hot-cell processes will continue using actual Savannah River Plant high-level waste, and process data will be developed for the Defense Waste Processing Facility design and construction.

## DEFENSE WASTE PROCESSING FACILITY

The Defense Waste Processing Facility provides an essential step in the processing of defense waste for ultimate disposal. This facility will immobilize defense high-level waste at Savannah River in a form suitable for transportation to and permanent disposal in a federal repository. Immobilization of the high-level waste and confinement in a geologic repository will insure the long-term isolation of the waste from the human environment with minimal maintenance and surveillance.

This project provides for construction of facilities to solidify the sludge fraction of the high-level waste which contains most of the hazardous radionuclides and virtually all of the long-lived activity. The Defense Waste Processing Facility process will separate, where practical, other useful materials from the waste such as mercury and noble metals.

Design of the Defense Waste Processing Facility began in FY 1979 and will continue through FY 1983, leading to the start of construction in early FY 1984. Recently we published the project Environmental Impact Statement and we expect to select the waste form (borosilicate glass or crystalline ceramic) before the end of FY 1982. Borosilicate glass has been the reference waste form for design purposes and the evidence to date does not indicate any reason to change. Construction will be completed and hot operation will begin in FY 1990.

## TRANSURANIC WASTE

Transuranic waste is nuclear waste which contains significant quantities of long-lived elements that lie beyond uranium in the periodic table of elements. In FY 1982, we will complete generation of compliance requirements for emplacing stored, contact-handled transuranic waste in the Waste Isolation Pilot Plant. This year newly generated transuranic waste at Rocky Flats will begin to be certified to meet the Waste Isolation Pilot Plant Waste Acceptance Criteria and placed into segregated storage at Idaho. Conceptual designs will be completed for a pilot plant to examine and certify the Idaho stored waste for the Waste Isolation Pilot Plant and an experimental pilot plant to test processing techniques for the stored wastes at Idaho (Chart 93) that are not acceptable, as is, for the Waste Isolation Pilot Plant. Standardized metal box containers for contact-handled waste will be developed and qualified for meeting waste acceptance criteria. In FY 1983, the Waste Isolation Pilot Plant compliance requirements for remote-handled transuranic waste will be developed, and technology development for assay instrumentation completed. The final designs for the Stored Waste Examination Pilot Plant and the Processing Experimental Pilot Plant facilities will be completed and qualified as meeting the necessary requirements. At all sites, the majority of the newly generated contact-handled transuranic waste will be certified as meeting the waste acceptance criteria and placed in interim storage separate from other waste.

The Agency is concerned about the safe disposal of the transuranic waste. The early program at Idaho to accomplish safe disposal focused on the Slagging Pyrolysis Incineration process to handle both stored and buried transuranic waste. However, there was some reservation about this incineration technology without a demonstration. Therefore, the Agency is conducting a full scale demonstration of this incineration process on non-radioactive wastes at the Reedy Creek Utilities facility (Chart 94) at Lake Buena Vista, Florida, during FY 1982. The goal is to demonstrate the viability of the slagging pyrolysis incineration process for Idaho-type waste before committing to a full scale facility for radioactive waste. Activities will also be initiated on other processes (shredding, rotary kiln incineration, and cementing) for further testing on a pilot scale through the Processing Experimental Pilot Plant discussed earlier. These efforts will provide the basis for selecting the best technology for processing transuranic wastes.

## LOW-LEVEL WASTE

Since FY 1977, the Low-Level Waste program has developed improved shallow land burial (Chart 95) technology and practices. In FY 1982, documents to identify current practices and uniform criteria for shallow land burial siting, design, operations and closure, as well as environmental monitoring, will be completed.

In FY 1983, the criteria for the low-level waste itself, including waste treatment, waste handling, waste packaging, and waste form testing will be completed. Current technology for waste treatment efforts will be documented, and advanced low-level waste treatment combustion processes will be developed. Improvements to land burial technology such as water and biological intrusion barriers are being developed. Demonstration of greater confinement techniques for certain transuranic-contaminated low-level wastes will begin during FY 1983 with the installation of instrumentation and caissons at the Nevada Test Site.

## AIRBORNE WASTE

The Airborne Waste program has developed and demonstrated real-time monitoring systems for gaseous and particulate effluents. During FY 1982, the development and field testing of an electrically-enhanced rolling pre-filter (Chart 96) will be completed to provide prevention of filter smoke-plugging in the event of fire. The development of improved particulate air filters at Rocky Flats using fiberglass compositions has resulted in doubling the lifetime of filters, thereby reducing replacement and disposal costs. The development of a pilot scale tritium recovery system will also be completed in FY 1982 at Mound Laboratory. In addition, airborne waste activities in FY 1983 will be completed for carbon-14 immobilization and thermal outgassing of irradiated fuels. Development of pre-filters will be completed with a static permanent charger filter, and an aerosol test system that will be developed for the Filter Testing Facilities.

## BYPRODUCTS UTILIZATION

Under the Byproducts Utilization program, we are developing safe, efficient, and cost-effective applications of radioisotopes and other materials recovered from the defense nuclear fuel cycle. In FY 1982, design will be completed for a shipping cask to more cost-effectively transport cesium for food and sludge irradiation (Charts 97 and 98). Support will be provided for the design of a sludge irradiation facility for the City of Albuquerque, New Mexico. Testing of second generation long-lived krypton/tritium lights for airfield application will be completed (Chart 99). The DOD has expressed particular interest in lightweight, hand-held tritium markers similar to this unit which we recently developed. During FY 1983, program efforts will continue to center on the use of cesium-137 for sewage sludge disinfection and food processing, the development of krypton-85 and tritium airfield lighting, and the recovery and use of strontium-90 for remote power applications (Chart 100).

## TRANSPORTATION RESEARCH AND DEVELOPMENT

The goal of the Agency's nuclear material transportation R&D program is to assure that safe, efficient, and cost-effective transportation systems are available to meet the needs of the defense nuclear waste programs. Activities for planning, design, development and testing of transport systems, packages, materials and equipment are carried out under the following program categories: Technology Development, Testing and Operational Safety, and Accident Analysis. This R&D is conducted at the Transportation Technology Center at the Sandia Laboratory in Albuquerque, New Mexico. These activities include materials and design developments, investigations, and testing; review of facility designs to optimize transport systems interfaces; and environmental and safety analyses to comply with or address concerns with the Department of Transportation's and the Nuclear Regulatory Commission's transport system regulations.

In FY 1982, the final design and scale model testing of a truck mounted transporter for contact-handled transuranic waste (TRUPACT) (Chart 101) will be completed. The conceptual design of a truck-carried high-level waste cask will be completed, and a report on the response of shipping casks to explosive devices will be issued.

In FY 1983, testing of a prototype TRUPACT will be completed, and final design will be initiated for the high-level waste cask for truck transport (Chart 102). FY 1983 tasks will also include the development of standards for containers and for the design of offsite shipping and receiving facilities; development of American Society of Mechanical Engineering Codes for equipment design; interfaces with shipping and receiving facilities; structural and thermal analysis and testing; materials properties investigations; risk assessment; and a transportation information service. Albuquerque Operations Office will continue to be the lead field office for management of the program, with Sandia Laboratories as the lead support contractor for this activity. Much of the work, however, will be carried out by industry, universities, and other national laboratories.

## TERMINAL STORAGE - WASTE ISOLATION PILOT PLANT

The Waste Isolation Pilot Plant is the key to our long-term waste management program (Chart 103). This research and development facility will demonstrate the permanent disposal of radioactive wastes from defense programs. It is exempt from licensing by the Nuclear Regulatory Commission.

The Waste Isolation Pilot Plant will demonstrate the safe handling of radioactive wastes on a credible scale, which would be typical of normal operational quantities. We are constructing a facility (Chart 104) to receive, inspect, and package for emplacement both remote-handled high-level and transuranic waste, and contact-handled transuranic waste, in an environment typical of a final disposal site. The Waste Isolation Pilot Plant will demonstrate the safe handling and emplacement of wastes at the same rates at which they are being generated.

Since issuing our Record of Decision on January 22, 1981, to proceed with the Waste Isolation Pilot Plant as authorized, significant progress has been made. On July 4, 1981, work was started to drill the first exploratory shaft. That shaft, 12 feet in diameter, is now completed. Its depth is 2,300 feet. A steel liner has been installed down to the salt formation (about 850 feet). Drilling of a second shaft, 6 feet in diameter, is also now complete. Its depth is 2,200 feet and it provides for ventilation and emergency exit during the exploratory program. Final design (Title II) was started in February 1981.

Under the Consultation and Cooperation Agreement, we are working closely with the State of New Mexico. An Administrative Land Withdrawal by the Department of Interior assures access to the site through the exploratory program. The requested supplemental appropriation of $5 million in fiscal year 1982 lets us acquire an additional 2,280 acres of hydrocarbon leases to protect the integrity of the site.

The FY 1983 funding will allow us to complete the exploratory phase of construction and begin construction of permanent surface and underground facilities. Major activities, besides the exploratory work, include roads, power, water, and contracts for the remaining shafts. Title II design will proceed. Funds are also included for the acquisition of hydrocarbon leases to protect the geologic integrity of the site.

We have reduced the cost of the project by about $200 million through more effective and austere construction plans. These savings will reduce our requirements beginning in fiscal year 1984 and will not affect either safety or the mission: to demonstrate the safe disposal of defense wastes, and dispel the notion that the government is unable or unwilling to resolve the nuclear waste problem.

## BUDGET REQUEST

(Chart 105) The total FY 1983 Appropriation Request is approximately $521 million for the Defense Nuclear Waste Program, and includes operating funds amounting to $289 million, capital equipment funding of $32 million, and $200 million for construction. The FY 1982 supplemental request is for $7 million; $2 million in operating funds and $5 million in construction.

## CONCLUSION

This completes my formal statement, Mr. Chairman. I would be pleased to answer any questions that you may have at this time.

# DEFENSE PROGRAMS

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## DEFENSE PROGRAMS MISSION

- DEVELOP AND MAINTAIN A CAPABILITY TO DESIGN, TEST AND MANUFACTURE ALL U.S. NUCLEAR WEAPONS
- DEVELOP AND MAINTAIN A CAPABILITY TO PRODUCE ALL NUCLEAR MATERIALS REQUIRED FOR THE U.S. WEAPONS PROGRAM AND MANAGE DEFENSE NUCLEAR WASTES
- CONDUCT A PROGRAM TO DEVELOP INERTIAL FUSION IN SUPPORT OF THE NATIONS MILITARY NEEDS
- ENSURE THE PROTECTION, CONTROL AND ACCOUNTABILITY OF SPECIAL NUCLEAR MATERIALS AND DOE FACILITIES
- DEVELOP AND MAINTAIN A CAPABILITY TO ASSURE VERIFICATION OF INTERNATIONAL ARMS AGREEMENTS AND TO CONTROL THE TRANSFER OF SENSITIVE TECHNOLOGY AND EQUIPMENT
- EXECUTE A PROGRAM TO CONTROL THE DISSEMINATION OF CLASSIFIED INFORMATION

CHART 1

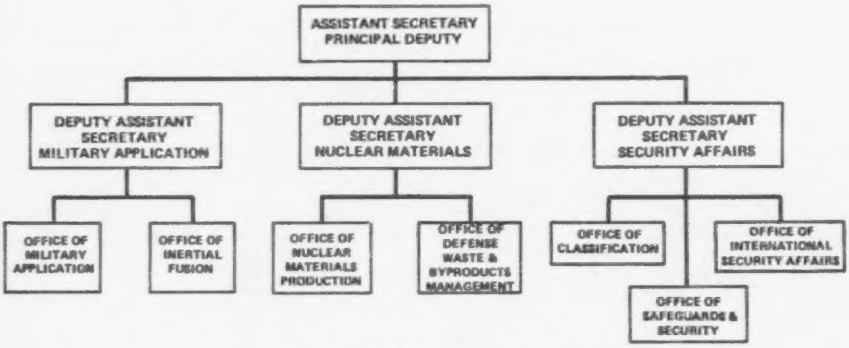

ASSISTANT SECRETARY PRINCIPAL DEPUTY
DEPUTY ASSISTANT SECRETARY MILITARY APPLICATION
DEPUTY ASSISTANT SECRETARY NUCLEAR MATERIALS
DEPUTY ASSISTANT SECRETARY SECURITY AFFAIRS
OFFICE OF MILITARY APPLICATION
OFFICE OF INERTIAL FUSION
OFFICE OF NUCLEAR MATERIALS PRODUCTION
OFFICE OF DEFENSE WASTE & BYPRODUCTS MANAGEMENT
OFFICE OF CLASSIFICATION
OFFICE OF INTERNATIONAL SECURITY AFFAIRS
OFFICE OF SAFEGUARDS & SECURITY

CHART 2

## DEFENSE PROGRAMS

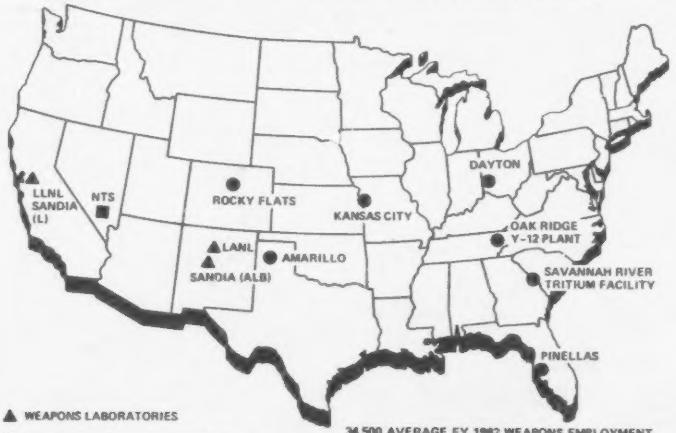
### ATOMIC ENERGY DEFENSE ACTIVITIES
### FY 1983 BUDGET SUMMARY
### (B/A $ in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| WEAPONS ACTIVITIES | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| RESEARCH, DEVELOPMENT & TESTING | $1,088.3 | $15.0 | $1,103.3 | $1,191.8 |
| INERTIAL FUSION | 209.1 | – | 209.1 | 152.7 |
| PRODUCTION AND SURVEILLANCE | 1,594.5 | 36.9 | 1,631.4 | 2,121.0 |
| PROGRAM DIRECTION | 50.2 | – | 50.2 | 51.3 |
| SUBTOTAL WEAPONS | 2,942.1 | 51.9 | 2,994.0 | 3,516.8 |
| VERIFICATION & CONTROL TECHNOLOGY | 50.0 | 2.0 | 52.0 | 53.9 |
| MATERIALS PRODUCTION | 904.4 | 36.5 | 940.9 | 1,228.5 |
| DEFENSE NUCLEAR WASTE | 364.9 | 7.0 | 371.9 | 520.8 |
| NUC. MATERIALS SECURITY & SAFEGUARDS | 47.2 | – | 47.2 | 47.4 |
| SECURITY INVESTIGATIONS | 23.6 | – | 23.6 | 28.5 |
| TOTAL DEFENSE PROGRAMS | $4,332.2 | $97.4 | $4,429.6 | $5,395.9 |
| NAVAL REACTORS | 359.1 | – | 359.1 | 420.8 |
| TOTAL ATOMIC ENERGY DEFENSE ACTIVITIES | $4,691.3 | $97.4 | $4,788.7 | $5,816.7 |

CHART 3

## DEFENSE PROGRAMS — WEAPONS ACTIVITIES

WEAPONS DEVELOPMENT, TESTING, AND PRODUCTION FACILITIES


LLNL
SANDIA
(L)
NTS
ROCKY FLATS
KANSAS CITY
DAYTON
OAK RIDGE
Y-12 PLANT
LANL
SANDIA (ALB)
AMARILLO
SAVANNAH RIVER
TRITIUM FACILITY
PINELLAS

▲ WEAPONS LABORATORIES
● WEAPONS PRODUCTION FACILITIES - MA
■ NEVADA TEST SITE

34,500 AVERAGE FY 1982 WEAPONS EMPLOYMENT
2,030 SQ. MILES OF LAND (ABOUT THE SIZE OF DELAWARE)
24 MILLION SQ. FT. FLOOR SPACE
250,000 ITEMS OF EQUIPMENT
$11 BILLION ESCALATED ACQUISITION COSTS IN FY 1983 DOLLARS

CHART 4

# DEFENSE PROGRAMS — WEAPONS ACTIVITIES

## WEAPON PROGRAM PRODUCTS

- STRATEGIC SYSTEMS
- LONG RANGE THEATER NUCLEAR SYSTEMS
- BATTLEFIELD NUCLEAR SYSTEMS
- FLEET AIR DEFENSE

CHART 16

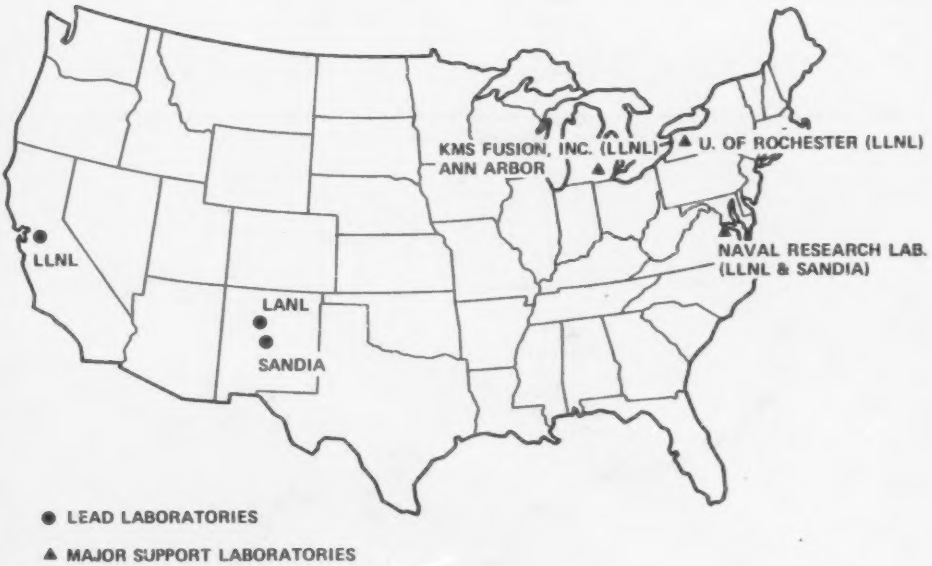

KMS FUSION, INC. (LLNL)
ANN ARBOR
▲ U. OF ROCHESTER (LLNL)
LLNL
NAVAL RESEARCH LAB.
(LLNL & SANDIA)
LANL
SANDIA
● LEAD LABORATORIES
▲ MAJOR SUPPORT LABORATORIES

CHART 23

## INERTIAL FUSION CONCEPT

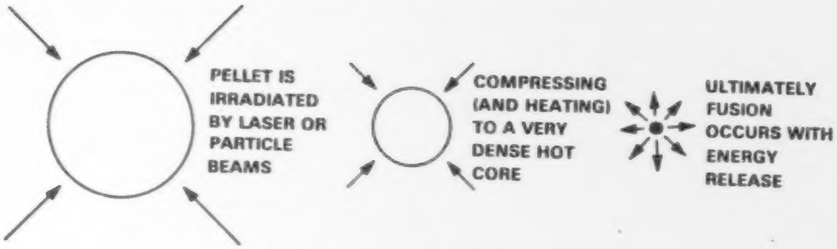

PELLET IS IRRADIATED BY LASER OR PARTICLE BEAMS
COMPRESSING (AND HEATING) TO A VERY DENSE HOT CORE
ULTIMATELY FUSION OCCURS WITH ENERGY RELEASE

CHART 25

## COMPUTER AIDED:

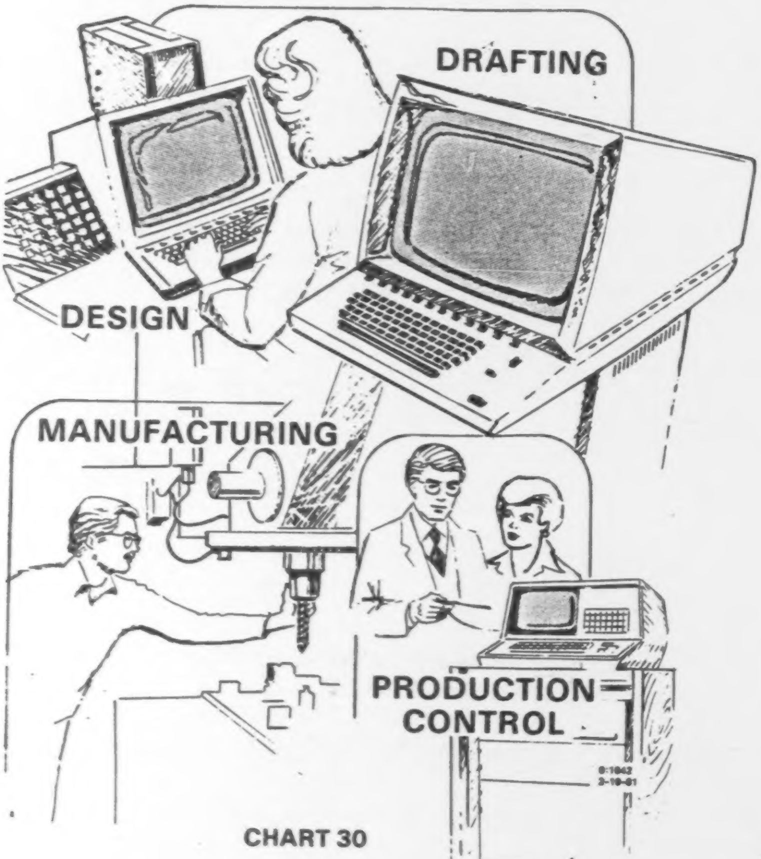

DRAFTING
DESIGN
MANUFACTURING
PRODUCTION CONTROL
0:1042
2-10-81

CHART 30

# DEFENSE PROGRAMS — WEAPONS ACTIVITIES

## WEAPONS ACTIVITIES FY 83 APPROPRIATIONS REQUEST (B/A in $ Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| OPERATING EXPENSES | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| RESEARCH, DEVELOPMENT, & TESTING | $ 934.3 | $15.0 | $ 949.3 | $1,075.0 |
| INERTIAL FUSION | 122.4 | – | 122.4 | 122.0 |
| PRODUCTION & SURVEILLANCE | 1,276.2 | 8.5 | 1,284.7 | 1,573.8 |
| PROGRAM DIRECTION | 50.2 | – | 50.2 | 51.3 |
| TOTAL, OPERATING EXPENSES | $2,383.1 | $23.5 | $2,406.6 | $2,822.1 |
| CONSTRUCTION | 395.9 | 28.4 | 424.3 | 493.7 |
| EQUIPMENT | 163.1 | – | 163.1 | 201.0 |
| TOTAL WEAPONS ACTIVITIES | $2,942.1 | $51.9 | $2,994.0 | $3,516.8 |

CHART 39

## FY 1983 WEAPONS BUDGET RESEARCH, DEVELOPMENT, AND TESTING OPERATING EXPENSES (B/A $ Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | BUDGET REQUEST |
| RESEARCH AND DEVELOPMENT | $577 | $10.0 | $587 | $ 650 |
| TESTING | 357 | 5.0 | 362 | 425 |
| TOTAL | $934 | $15.0 | $949 | $1,075 |

CHART 41

## FY 1983 WEAPONS BUDGET INERTIAL FUSION OPERATING EXPENSES (B/A $ Millions)

| FY 1982 | FY 1983 AMENDED REQUEST |
|---|---|
| $122.4 | $122.0 |

CHART 42

## DEFENSE PROGRAMS — WEAPONS ACTIVITIES

### WEAPONS ACTIVITIES
### FY 1983 BUDGET REQUEST
### CAPITAL EQUIPMENT
### (BA $ Millions)

| FY 1982 | FY 1983 |
|---|---|
| $163.1 | $201.0 |

CHART 43

### CONSTRUCTION PROJECTS
### (Dollars in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | REVISED REQUEST |
| PRODUCTION & SURVEILLANCE | | | | |
| CONTINUING PROJECTS | $157.5 | $28.4 | $185.9 | $412.5 |
| NEW PROJECTS | 141.8 | 0 | 141.8 | 39.6 |
| FY 1982 GENERAL REDUCTION | -51.0 | 0 | -51.0 | 0 |
| SUBTOTAL | $248.3 | $28.4 | $276.7 | $452.1 |
| RESEARCH, DEVELOPMENT, & TESTING | | | | |
| CONTINUING PROJECTS | 39.8 | 0 | 39.8 | 6.0 |
| NEW PROJECTS | 32.1 | 0 | 32.1 | 15.8 |
| SUBTOTAL | $ 71.9 | 0 | $ 71.9 | $ 21.8 |
| INERTIAL FUSION | | | | |
| CONTINUING PROJECTS | 75.7 | 0 | 75.7 | 19.8 |
| NEW PROJECTS | 0 | 0 | 0 | 0 |
| SUBTOTAL | $ 75.7 | 0 | $ 75.7 | $ 19.8 |
| TOTAL | $395.9 | $28.4 | $424.3 | $493.7 |

CHART 44

## DEFENSE PROGRAMS — VERIFICATION AND CONTROL TECHNOLOGY

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### GOALS

- DEVELOP AND PRODUCE NUCLEAR TEST TREATY VERIFICATION AND MONITORING TECHNOLOGY
- EXECUTE EXPORT CONTROL, TECHNOLOGY TRANSFER RESPONSIBILITIES
- SUPPORT TECHNICAL AND ANALYTICAL ASPECTS OF ARMS CONTROL POLICY AND IMPLEMENTATION
- PROVIDE AGENCY EXPERTISE AND SUPPORT TO THE NATIONAL FOREIGN INTELLIGENCE PROGRAM

CHART 45

### SPACEBORNE SENSORS — FY 83 EFFORT

*DELETED*

- SENSORS FOR GLOBAL POSITIONING SATELLITE (GPS)
- ENGINEERING FOR SHUTTLE-COMPATIBLE SATELLITES
- CONTINUE DEEP SPACE TECHNOLOGY DEVELOPMENT
- MAINTAIN R&D BASE
- CONTINUE OPERATIONAL SUPPORT FOR DELIVERED SYSTEMS

CHART 46

## DEFENSE PROGRAMS – VERIFICATION AND CONTROL TECHNOLOGY

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### SEISMIC DETECTION

- DETERMINE EFFECTIVENESS OF REGIONAL SEISMIC DETECTION
- CONTINUE R&D TECHNOLOGY FOR SEISMIC DETECTION
- PROVIDE TIMELY RESPONSE CAPABILITY FOR IN-COUNTRY SYSTEM DEPLOYMENT
- OPERATE REGIONAL SEISMIC TEST NETWORK (RSTN)

CHART 47

### NON-SEISMIC DETECTION

R&D ON USE OF ATMOSPHERIC PHENOMENA FOR UNDERGROUND NUCLEAR EXPLOSION DETECTION

- INFRASONIC MONITORING
- IONOSPHERIC MONITORING

CHART 48

## DEFENSE PROGRAMS — VERIFICATION AND CONTROL TECHNOLOGY

### OTHER ACTIVITIES

- PNET ONSITE VERIFICATION READINESS
- ANALYTICAL SUPPORT
  - EXPORT CONTROL/TECHNOLOGY TRANSFER
  - ARMS CONTROL/NEGOTIATIONS SUPPORT/ POLICY STUDIES
  - WEAPONS AND PROLIFERATION INTELLIGENCE

CHART 50

### FY 1983 BUDGET REQUEST (BA in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | BUDGET REQUEST |
| OPERATING EXPENSES | | | | |
| DETECTION TECHNOLOGY | $36.7 | $2.0 | $38.7 | $41.7 |
| ANALYTICAL SUPPORT | 10.4 | – | 10.4 | 8.9 |
| PROGRAM DIRECTION | 1.8 | – | 1.8 | 1.8 |
| TOTAL OPERATING EXPENSES | $48.9 | $2.0 | $50.9 | $52.4 |
| CAPITAL EQUIPMENT | 1.1 | – | 1.1 | 1.5 |
| TOTAL | $50.0 | $2.0 | $52.0 | $53.9 |

*DELETED*

CHART 51

# DEFENSE PROGRAMS — NUCLEAR MATERIALS SECURITY AND SAFEGUARDS

---

## MISSION

PROTECT CLASSIFIED INFORMATION AGAINST MISUSE: PROTECT NUCLEAR WEAPONS, MATERIALS AND FACILITIES AGAINST THEFT AND SABOTAGE: AND PROVIDE SAFEGUARDS TECHNICAL SUPPORT TO U.S. AND INTERNATIONAL ACTIVITIES TO MINIMIZE THE PROLIFERATION OF NUCLEAR WEAPONS.

CHART 52

## MAJOR ACTIVITIES

- SECURITY OPERATIONS
- SAFEGUARDS OPERATIONS
- INTERNATIONAL SAFEGUARDS
- TECHNOLOGY DEVELOPMENT
- CLASSIFICATION
- PROGRAM DIRECTION

CHART 53

- SECURITY INVESTIGATION/CLEARANCE PROCESS IS KEY ELEMENT IN SECURITY SYSTEM
- INVESTIGATIONS CONDUCTED BY OPM AND FBI
- APPROXIMATELY 29,000 CLEARANCES TO BE CONDUCTED IN FY 83
- ADEQUATE FUNDING IS REQUIRED TO ENSURE CLEARED PERSONNEL ARE AVAILABLE FOR DEFENSE PROGRAMS

CHART 54

## DEFENSE PROGRAMS — NUCLEAR MATERIALS SECURITY AND SAFEGUARDS

### FY 1983 BUDGET REQUEST
### (BA in $ Millions)

| | FY 1982 | FY 1983 |
|---|---|---|
| **OPERATING EXPENSES** | | |
| OPERATIONS | $38.4 | $37.3 |
| PROGRAM DIRECTION | 5.1 | 5.9 |
| TOTAL OPERATING EXPENSES | 43.5 | 43.2 |
| **CONSTRUCTION** | 0 | 0.5 |
| **EQUIPMENT** | 3.7 | 3.7 |
| TOTAL | $47.2 | $47.4 |

SECURITY INVESTIGATIONS

| | FY 1982 | FY 1983 AMENDED REQUEST |
|---|---|---|
| **OPERATING EXPENSES** | $23.6 | $28.5 |
| TOTAL | $23.6 | $28.5 |

CHART 55

## DEFENSE PROGRAMS
## NUCLEAR MATERIALS PRODUCTION

### MISSION

PRODUCTION OF NUCLEAR MATERIALS

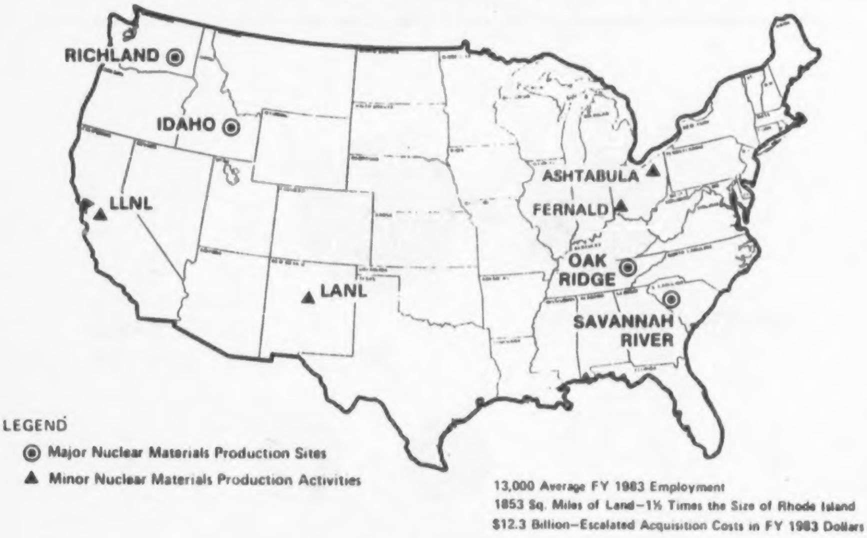
- PLUTONIUM
- TRITIUM
- OTHER RADIOISOTOPES

FOR USE IN:

- MILITARY PROGRAMS
- GOVERNMENT RESEARCH AND DEVELOPMENT
  - — E.G., BREEDER REACTORS
- INDUSTRY, MEDICINE, COMMERCE

CHART 56

## NUCLEAR MATERIALS PRODUCTION SITES


RICHLAND
IDAHO
LLNL
LANL
ASHTABULA
FERNALD
OAK RIDGE
SAVANNAH RIVER
LEGEND
◉ Major Nuclear Materials Production Sites
▲ Minor Nuclear Materials Production Activities

13,000 Average FY 1983 Employment
1853 Sq. Miles of Land—1½ Times the Size of Rhode Island
$12.3 Billion—Escalated Acquisition Costs in FY 1983 Dollars

CHART 57

## DEFENSE PROGRAMS — NUCLEAR MATERIALS

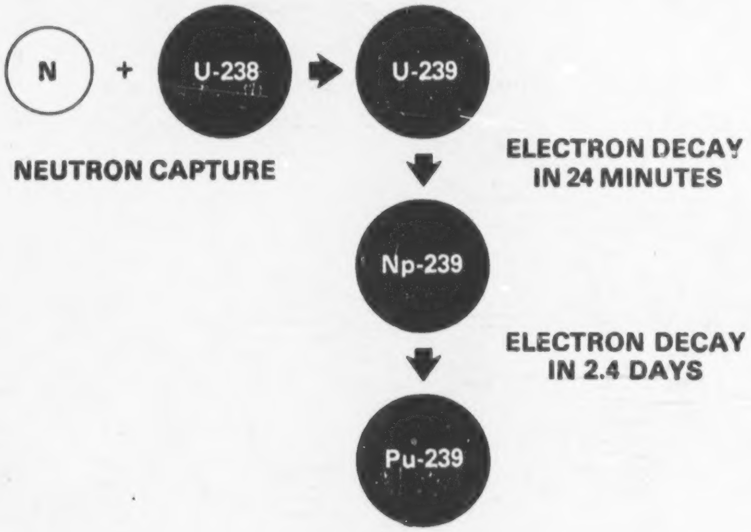

N
+
U-238
U-239
NEUTRON CAPTURE
ELECTRON DECAY IN 24 MINUTES
Np-239
ELECTRON DECAY IN 2.4 DAYS
Pu-239

CHART 58

# DEFENSE PROGRAMS — NUCLEAR MATERIALS

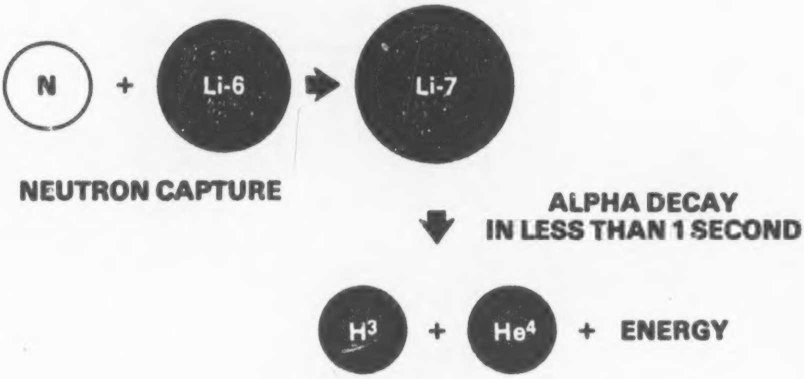

N
+
Li-6
Li-7
NEUTRON CAPTURE
ALPHA DECAY
IN LESS THAN 1 SECOND
H3
+
He4
+ ENERGY

CHART 59

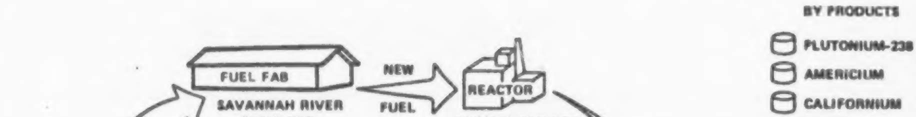

BY PRODUCTS
PLUTONIUM-238
AMERICIUM
CALIFORNIUM
KRYPTON
COBALT-60
CURIUM
CESIUM
STRONTIUM
FUEL FAB
SAVANNAH RIVER
RICHLAND
NEW
FUEL
REACTOR
SAVANNAH RIVER
RICHLAND
URANIUM
DEFENSE NUCLEAR FUEL CYCLE
SPENT
FUEL
URANIUM METAL
FERNALD, O.
ASHTABULA, O.
METAL
OAK RIDGE
RECYLCE (LO)
RECYCLE (HI ENR. U.)
REPROCESSING
SAVANNAH RIVER
RICHLAND
IDAHO
TRITIUM
PLUTONIUM
WASTE
NEW URANIUM
GASEOUS
DIFFUSION
OAK RIDGE, T.
PADUCAH, K.
PORTSMOUTH, O.
SPENT
FUEL
TEST
REACTORS
NAVY FUELS

CHART 60

# DEFENSE PROGRAMS — NUCLEAR MATERIALS

### NUCLEAR MATERIALS PRODUCTION
### FY 1983 BUDGET SUMMARY
### (BA in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| BASE | $637.3 | $11.9 | $649.2 | $ 781.1 |
| PRODUCTION ACTIVITIES (FY 1981/1982) | | | | |
| RESTORATION | 71.2 | 0 | 71.2 | 111.4 |
| L REACTOR UPGRADE | 62.5 | 0 | 62.5 | 74.2 |
| INCREASE PU PRODUCTION | 22.2 | 2.0 | 24.2 | 45.5 |
| SPECIAL ISOTOPE SEPARATION | 46.2 | 0 | 46.2 | 40.0 |
| PUREX | 45.2 | 3.6 | 48.8 | 67.1 |
| N REACTOR INCREASED PRODUCTION OPTIONS | 17.1 | 12.8 | 29.9 | 57.7 |
| NEW PRODUCTION REACTOR | 2.7 | 0 | 2.7 | 2.0 |
| HIGH PRODUCTIVITY CORE LOADING | 0 | 3.2 | 3.2 | 31.4 |
| EXPANSION & MODS OF EXISTING FUELS PROCESSING FACILITY | 0 | 3.0 | 3.0 | 18.1 |
| TOTAL | $904.4 | $36.5 | $940.9 | $1,228.5 |

CHART 77

## BLENDING

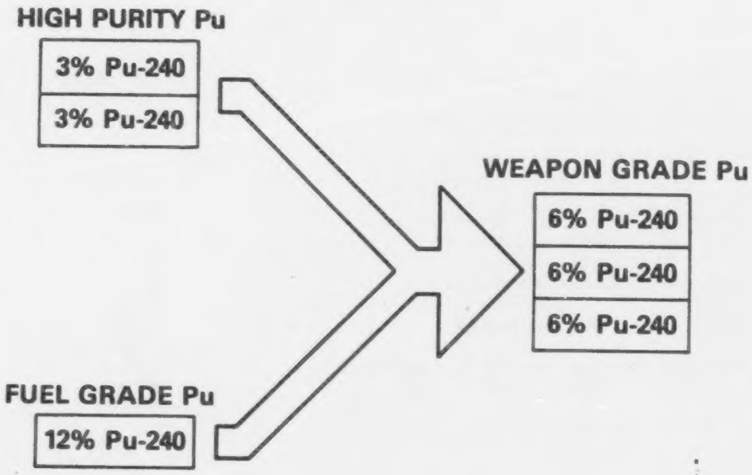

HIGH PURITY Pu
3% Pu-240
3% Pu-240
WEAPON GRADE Pu
6% Pu-240
6% Pu-240
6% Pu-240
FUEL GRADE Pu
12% Pu-240

CHART 78

# DEFENSE PROGRAMS – NUCLEAR MATERIALS

## NUCLEAR MATERIALS PRODUCTION
FY 1983 BUDGET REQUEST
(BA in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| OPERATING | | | | |
| REACTOR OPERATIONS | $275.0 | $15.7 | $290.7 | $ 360.4 |
| PROCESSING OF NUCLEAR MATERIALS | 148.7 | 4.4 | 153.1 | 220.6 |
| SPECIAL ISOTOPE SEPARATIONS RESEARCH | 28.2 | 0 | 28.2 | 23.0 |
| SUPPORTING SERVICES | 145.1 | 11.8 | 156.9 | 242.0 |
| PROGRAM DIRECTION | 1.8 | 0 | 1.8 | 2.1 |
| SUBTOTAL | 598.8 | 31.9 | 630.7 | 848.1 |
| CAPITAL EQUIPMENT | 63.0 | 4.6 | 67.6 | 107.7 |
| CONSTRUCTION | 242.6 | 0 | 242.6 | 272.7 |
| TOTAL | $904.4 | $36.5 | $940.9 | $1,228.5 |

CHART 79

## MATERIALS PRODUCTION
FY 1983 BUDGET REQUEST
NEW CONSTRUCTION PROJECTS (DOLLARS IN MILLIONS)

| | | Total Estimated Cost* | New Auth. | Amended Approp. Request |
|---|---|---|---|---|
| 83-D-135 | General Plant Projects, Various Locations | $26.0 | $26.0 | $26.0 |
| 83-D-136 | Plant Engineering & Design | 2.0 | 2.0 | 2.0 |
| 83-D-138 | Purex Canyon and Dissolver Filter Systems Improvements, RL | 12.8 | 4.3 | 4.3 |
| 83-D-142 | Fuel Dissolver Off-Gas Transfer and Treatment System, ID | 7.6 | 7.6 | 3.5 |
| 83-D-146 | Water Pollution Control, FMPC, OR | 9.5 | 9.5 | 1.4 |
| 83-D-147 | Pollution Discharge Elimination, SR | 9.4 | 1.0 | 1.0 |
| 83-D-148 | Non-Radioactive Hazardous Waste Management, SR | 19.9 | 1.0 | 1.0 |
| 83-D-180 | Facility Storage Modifications, VL | 16.3 | 16.3 | 9.3 |
| | Subtotal | | $67.7 | $48.5 |

*EXCLUDES PE&D

CHART 80

# DEFENSE PROGRAMS - MATERIALS PRODUCTION

## MATERIALS PRODUCTION
### FY 1983 BUDGET REQUEST
### CONTINUING CONSTRUCTION PROJECTS
### (DOLLARS IN MILLIONS)

| | | | Thru FY 1982 | | FY 1983 | |
|---|---|---|---|---|---|---|
| | | Total Estimated Cost* | Author. | Approp. | Author. | Amended Approp. |
| 82-D-124 | Restoration of Production Capabilities, Phases II and III, VL | $212.2 | $126.0 | $ 47.0 | $ 48.5 | $ 87.7 |
| 82-D-126 | Reactor Safety and Reliability, VL | 61.6 | 42.9 | 6.0 | 18.7 | 7.0 |
| 82-D-136 | Fuel Processing Facilities Upgrade, IFPF, INEL, ID | 46.0 | 40.0 | 14.0 | 6.0 | 14.0 |
| 82-D-201 | Special Plutonium Recovery Facility, JB Line, SR | 64.0 | 2.0 | – | 62.0 | 16.0 |
| 81-D-126 | Pollution Abatement Facilities – Chemical Processing Plants, RL | 5.3 | 5.3 | 2.6 | – | 2.7 |
| 81-D-128 | Restoration of Production Capabilities, Phase I | 50.4 | 50.4 | 40.3 | – | 10.1 |
| 81-D-131 | Remote Analytical Facility Upgrade and Expansion, ID | 28.5 | 28.5 | 18.0 | – | 8.5 |
| 81-D-142 | Steam Transfer Header, SR | 18.4 | 8.0 | 5.5 | 10.4 | 5.5 |
| 81-D-143 | L Reactor Upgrade, SR | 134.0 | 115.0 | 81.5 | 19.0 | 52.5 |
| 81-T-502 | Advanced Isotope Separation Laboratory, LLNL** | 25.0 | 21.2 | 16.0 | – | 7.2 |
| 80-AE-2 | Replace Obsolete Processing Facilities, HB Line, SR | 19.0 | 19.0 | 16.0 | – | 3.0 |
| 77-13-A | Fluorinel Dissolution Process and Fuel Receiving Improvement, ID | 199.4 | 199.4 | 189.4 | – | 10.0 |
| | SUBTOTAL | | | | $164.6 | $224.2 |
| | GRAND TOTAL | | | | $232.3 | $272.7 |

*Excludes PE&D

**$1.8M Appropriated in the Uranium Enrichment Appropriation; $2M Appropriated to Materials Production in FY 1981. Authorized Project 82-D-202, $16M Appropriated in FY 82.

CHART 81

# DEFENSE PROGRAMS
# DEFENSE NUCLEAR WASTE

**GOAL:** Assure That Nuclear Wastes Are Safely Handled, Treated, Stored or Utilized, Transported and Disposed of to Protect the Public Health and Safety

**OBJECTIVES:**

- Provide for Safe Utilization or Interim Storage of Wastes;
- Develop Alternative Technologies and Processes to Support Final Disposal;
- Develop an R&D Facility to Demonstrate Geologic Disposal of Defense Wastes;
- Test Transportation Systems to Safely Carry Defense Generated Wastes; and
- Clean up Surplus Facilities From Defense Activities to Recover Materials and Prepare for Reuse.

CHART 82

## DEFENSE PROGRAMS
## DEFENSE NUCLEAR WASTE

### Defense Waste Inventory

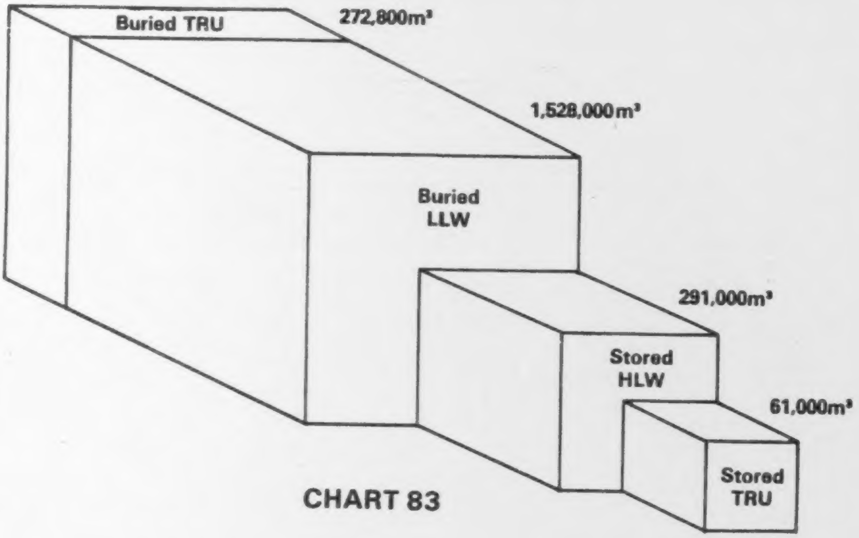


CHART 83

### DOE DEFENSE HIGH-LEVEL WASTE INVENTORY

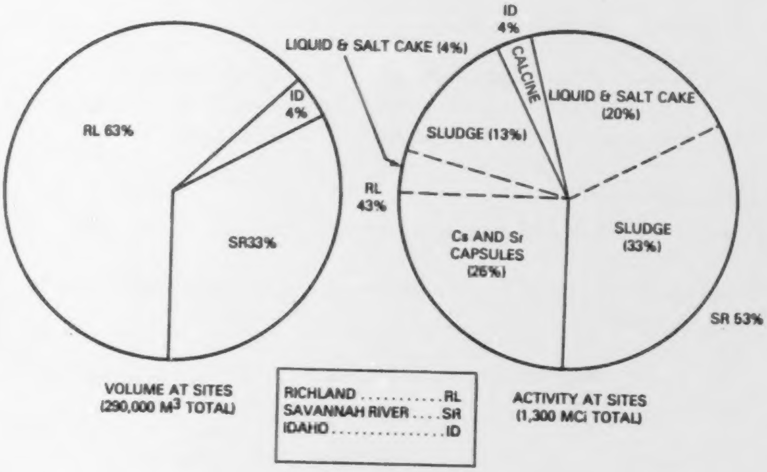
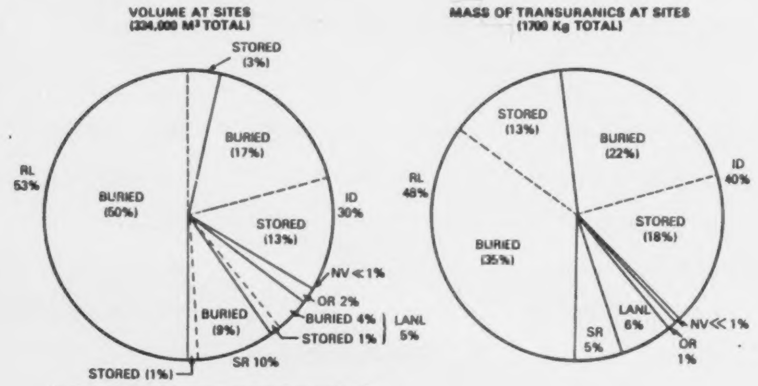


CHART 84

# DEFENSE PROGRAMS
# DEFENSE NUCLEAR WASTE

## DOE DEFENSE TRANSURANIC WASTE INVENTORY



| SITE | % OF STORED | % OF BURIED |
|---|---|---|
| IDAHO (ID) | 69 | 21 |
| RICHLAND (RL) | 17 | 61 |
| LOS ALAMOS (LANL) | 7 | 4 |
| SAVANNAH RIVER (SR) | 4 | 12 |
| OAK RIDGE (OR) | 2 | 2 |
| NEVADA (NV) | 1 | < 1 |
| TOTALS | 61,000 M³ | 273,000 M³ |

EXCLUDES: HIGH-LEVEL WASTE (830 Kg)
SURPLUS FACILITIES (50 Kg)

CHART 85

## LOCATIONS OF DOE RADIOACTIVELY CONTAMINATED SURPLUS FACILITIES (DEFENSE)

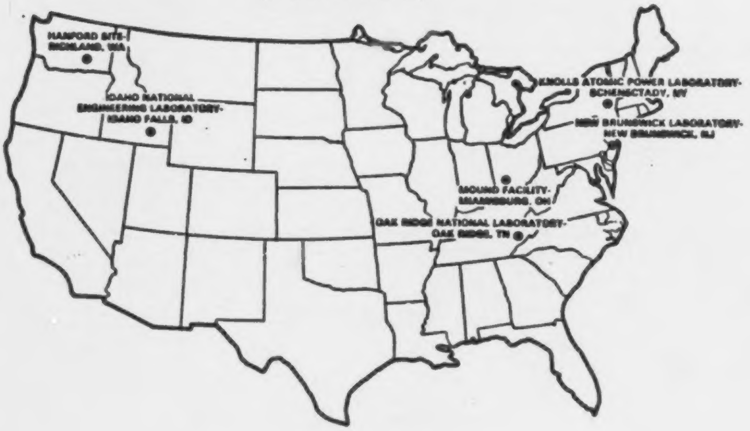

HANFORD SITE-
RICHLAND, WA
IDAHO NATIONAL
ENGINEERING LABORATORY-
IDAHO FALLS, ID
KNOLLS ATOMIC POWER LABORATORY-
SCHENECTADY, NY
NEW BRUNSWICK LABORATORY-
NEW BRUNSWICK, NJ
MOUND FACILITY-
MIAMISBURG, OH
OAK RIDGE NATIONAL LABORATORY-
OAK RIDGE, TN

CHART 89

# DEFENSE PROGRAMS
# DEFENSE NUCLEAR WASTE

## LONG-TERM WASTE MANAGEMENT TECHNOLOGY

| PROGRAM ELEMENTS | LEAD DOE OFFICES | LEAD CONTRACTORS |
|---|---|---|
| HIGH-LEVEL WASTE (HLW) | SAVANNAH RIVER | DUPONT |
| TRANSURANIC WASTE (TRU) | ALBUQUERQUE | ROCKWELL INT'L |
| LOW-LEVEL WASTE (LLW) | IDAHO | EG&G |
| AIRBORNE WASTE (ABW) | IDAHO | EXXON NUCLEAR |
| BYPRODUCT UTILIZATION | HEADQUARTERS | |

**CHART 90**

### DEFENSE NUCLEAR WASTE MANAGEMENT FY 1983 BUDGET REQUEST (BA in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROP. | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| INTERIM WASTE OPERATIONS | $232.0* | $2.0 | $234.0* | $281.3 |
| DECONTAMINATION AND DECOMMISSIONING | 4.1 | 0 | 4.1 | 12.8 |
| LONG-TERM WASTE MANAGEMENT TECHNOLOGY | 81.2 | 0 | 81.2 | 92.3 |
| TRANSPORTATION RESEARCH AND DEVELOPMENT | 6.9 | 0 | 6.9 | 7.0 |
| TERMINAL STORAGE | 39.1 | 5.0 | 44.1 | 125.4 |
| PROGRAM DIRECTION | 1.6 | 0 | 1.6 | 2.0 |
| TOTAL | $364.9 | $7.0 | $371.9 | $520.8 |

*INCLUDES $930,000 IN CAPITAL EQUIPMENT FUNDING AND $3,532,000 IN CONSTRUCTION FUNDING FOR IDAHO LANDLORD ACTIVITIES FOR COMPARABILITY PURPOSES ONLY.

**CHART 105**

### INTRODUCTION OF ASSOCIATES

Mr. ROSER. We will be flexible and be happy to come back at any time.

I have with me today my principal deputy, on my left, Mr. Troy Wade; and Dr. Richard Wagner from the Department of Defense, the Assistant to the Secretary of Defense for Atomic Energy and, of course, Dr. Roger Batzel, the Director of the Lawrence Livermore National Laboratory, who will speak briefly on one of the special isotope separation processes that we have under development, Mr. Chairman, [deleted].

So, with your permission, I would like to use a few viewgraphs and summarize the things that I wanted to say.

## DEFENSE PROGRAMS

---

### DEFENSE PROGRAMS MISSION

- DEVELOP AND MAINTAIN A CAPABILITY TO DESIGN, TEST AND MANUFACTURE ALL U.S. NUCLEAR WEAPONS
- DEVELOP AND MAINTAIN A CAPABILITY TO PRODUCE ALL NUCLEAR MATERIALS REQUIRED FOR THE U.S. WEAPONS PROGRAM AND MANAGE DEFENSE NUCLEAR WASTES
- CONDUCT A PROGRAM TO DEVELOP INERTIAL FUSION IN SUPPORT OF THE NATIONS MILITARY NEEDS
- ENSURE THE PROTECTION, CONTROL AND ACCOUNTABILITY OF SPECIAL NUCLEAR MATERIALS AND DOE FACILITIES
- DEVELOP AND MAINTAIN A CAPABILITY TO ASSURE VERIFICATION OF INTERNATIONAL ARMS AGREEMENTS AND TO CONTROL THE TRANSFER OF SENSITIVE TECHNOLOGY AND EQUIPMENT
- EXECUTE A PROGRAM TO CONTROL THE DISSEMINATION OF CLASSIFIED INFORMATION

**CHART 106**

### DEFENSE PROGRAMS MISSION

Briefly, our program involves the design, test, and manufacture of nuclear weapons; the production of nuclear materials for those weapons; management of the wastes; and the inertial fusion program, a part of our military program. We have the responsibility for protection of facilities and the control and accountability of special nuclear materials. We are involved, of course, in verification of international agreements and the transfer of technology and equipment. And we are responsible for the classification program.

## DEFENSE PROGRAMS

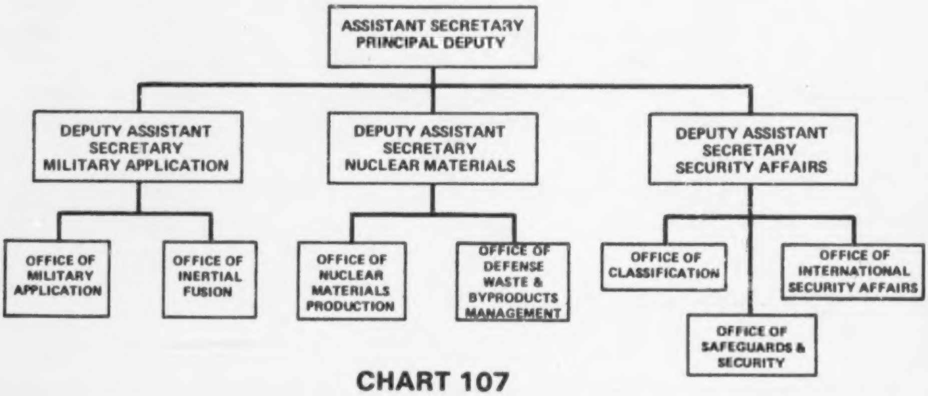

ASSISTANT SECRETARY
PRINCIPAL DEPUTY
DEPUTY ASSISTANT SECRETARY MILITARY APPLICATION
DEPUTY ASSISTANT SECRETARY NUCLEAR MATERIALS
DEPUTY ASSISTANT SECRETARY SECURITY AFFAIRS
OFFICE OF MILITARY APPLICATION
OFFICE OF INERTIAL FUSION
OFFICE OF NUCLEAR MATERIALS PRODUCTION
OFFICE OF DEFENSE WASTE & BYPRODUCTS MANAGEMENT
OFFICE OF CLASSIFICATION
OFFICE OF INTERNATIONAL SECURITY AFFAIRS
OFFICE OF SAFEGUARDS & SECURITY

**CHART 107**

ORGANIZATION

Just briefly, last year at this time the organization was in a state of flux. I now have in place a full organization, with three deputy assistant secretaries—one for military application, General Hoover, who is here with me; one for nuclear materials, Dr. Gilbert, who is seated next to General Hoover; and one for security affairs, Jim Culpepper, who is seated next. We do now have, I think, a good organization. It is functioning well.

## DEFENSE PROGRAMS

---

### ATOMIC ENERGY DEFENSE ACTIVITIES
### FY 1983 BUDGET SUMMARY
### (B/A $ in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| WEAPONS ACTIVITIES | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| RESEARCH, DEVELOPMENT & TESTING | $1,088.3 | $15.0 | $1,103.3 | $1,191.8 |
| INERTIAL FUSION | 209.1 | – | 209.1 | 152.7 |
| PRODUCTION AND SURVEILLANCE | 1,594.5 | 36.9 | 1,631.4 | 2,121.0 |
| PROGRAM DIRECTION | 50.2 | – | 50.2 | 51.3 |
| SUBTOTAL WEAPONS | 2,942.1 | 51.9 | 2,994.0 | 3,516.8 |
| VERIFICATION & CONTROL TECHNOLOGY | 50.0 | 2.0 | 52.0 | 53.9 |
| MATERIALS PRODUCTION | 904.4 | 36.5 | 940.9 | 1,228.5 |
| DEFENSE NUCLEAR WASTE | 364.9 | 7.0 | 371.9 | 520.8 |
| NUC. MATERIALS SECURITY & SAFEGUARDS | 47.2 | – | 47.2 | 47.4 |
| SECURITY INVESTIGATIONS | 23.6 | – | 23.6 | 28.5 |
| TOTAL DEFENSE PROGRAMS | $4,332.2 | $97.4 | $4,429.6 | $5,395.9 |
| NAVAL REACTORS | 359.1 | – | 359.1 | 420.8 |
| TOTAL ATOMIC ENERGY DEFENSE ACTIVITIES | $4,691.3 | $97.4 | $4,788.7 | $5,816.7 |

**CHART 108**

BUDGET REQUEST

I will summarize our budget request for fiscal year 1983, including the amendment which has been submitted and is here along with the initial budget. I won't go through the figures in detail. The weapons activities request is about $3.5 billion; verification and control a little over $50 million; materials production about $1.3 billion; defense nuclear waste about $0.5 billion; nuclear materials security and safeguards about $48 million; security investigations about $28 million. The total for my programs is $5,395,900,000. Naval reactors, of course, is not my responsibility, but it is included in the defense activities budget request.

WEAPONS PRODUCTION

[Deleted.]

TECHNOLOGY ADVANCES

[Deleted.]

Chairman HATFIELD. Excuse me, Mr. Roser, could I interrupt? Do you have everyone identified on that side of the room?

Mr. ROSER. Yes; we have verified the clearances.

Chairman HATFIELD. Thank you. I just wanted to make sure. [Deleted.]

WEAPONS IN PRODUCTION AND DEVELOPMENT

Mr. ROSER. These are the systems that we are producing.

[Chart deleted.]

We have two tactical bombs, the B61–3 and –4; a version of the Lance missile warhead; the Trident warhead, the Minuteman III warhead, and the 8-inch artillery-fired atomic projectile. [Deleted.]

### TESTING

[Chart deleted.]

Just briefly, this is the history of our test program. [Deleted.] I hope that in the future we can better describe our testing effort in terms of the data we are able to get and what diagnostics we are able to do, rather than necessarily speak to the number of tests. [Deleted.]

## DEFENSE PROGRAMS INERTIAL FUSION

---

## OBJECTIVES

**R&D TO DETERMINE FEASIBILITY OF RELEASE OF SIGNIFICANT THERMONUCLEAR ENERGY FROM SMALL FUEL PELLETS HEATED BY LASERS OR PARTICLE BEAMS**

- **USE THIS ENERGY FOR WEAPON PHYSICS STUDIES, WEAPON EFFECTS SIMULATION**
- **DETERMINE ITS POTENTIAL USE AS AN ENERGY SOURCE IF HIGH GAINS PROVE TO BE FEASIBLE**

**CHART 115**

### INERTIAL FUSION

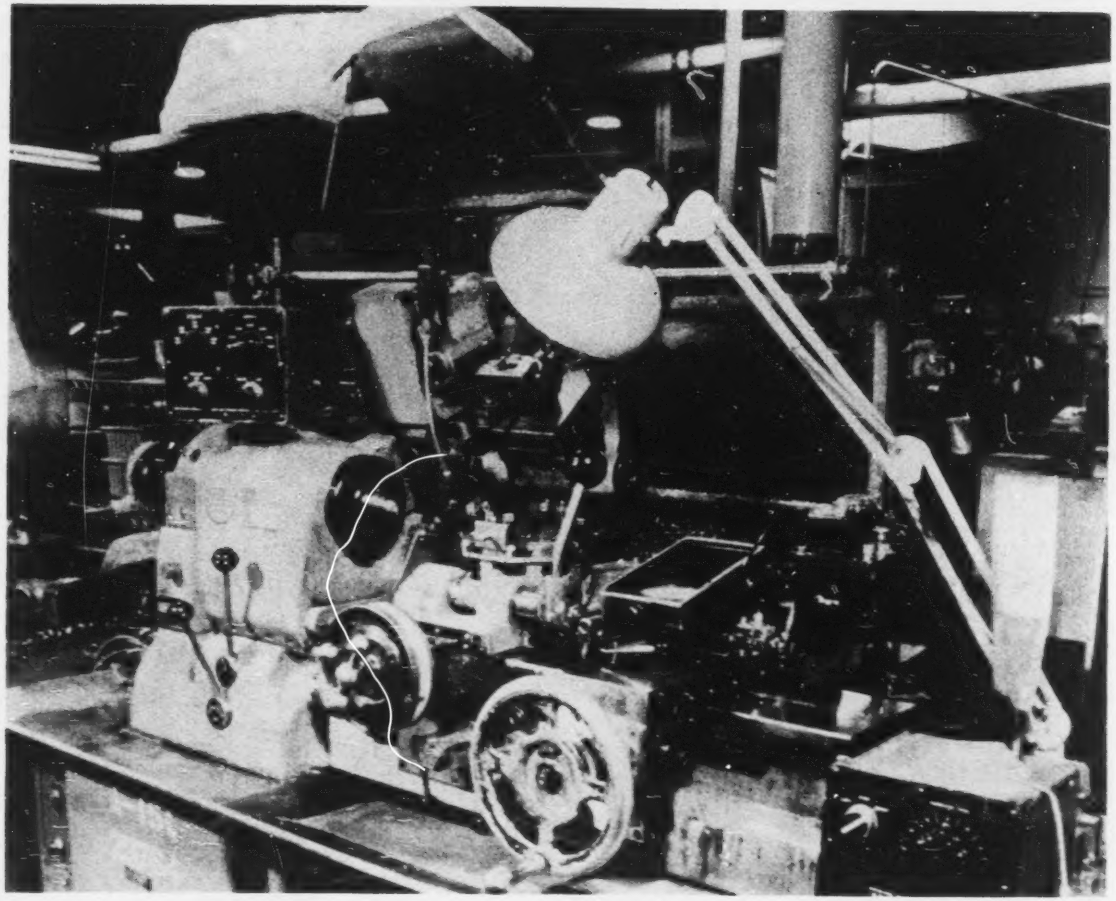
The inertial fusion program is principally for using laser or particle beams on fuel pellets to do weapons physics studies. That is the thrust of the program. We are directing the program toward weapons physics effects and weapons effects simulations. As we proceed in that program, and if it is as successful as we believe it will be, then in the future we will be able to determine if it really has potential as an energy source in the future.

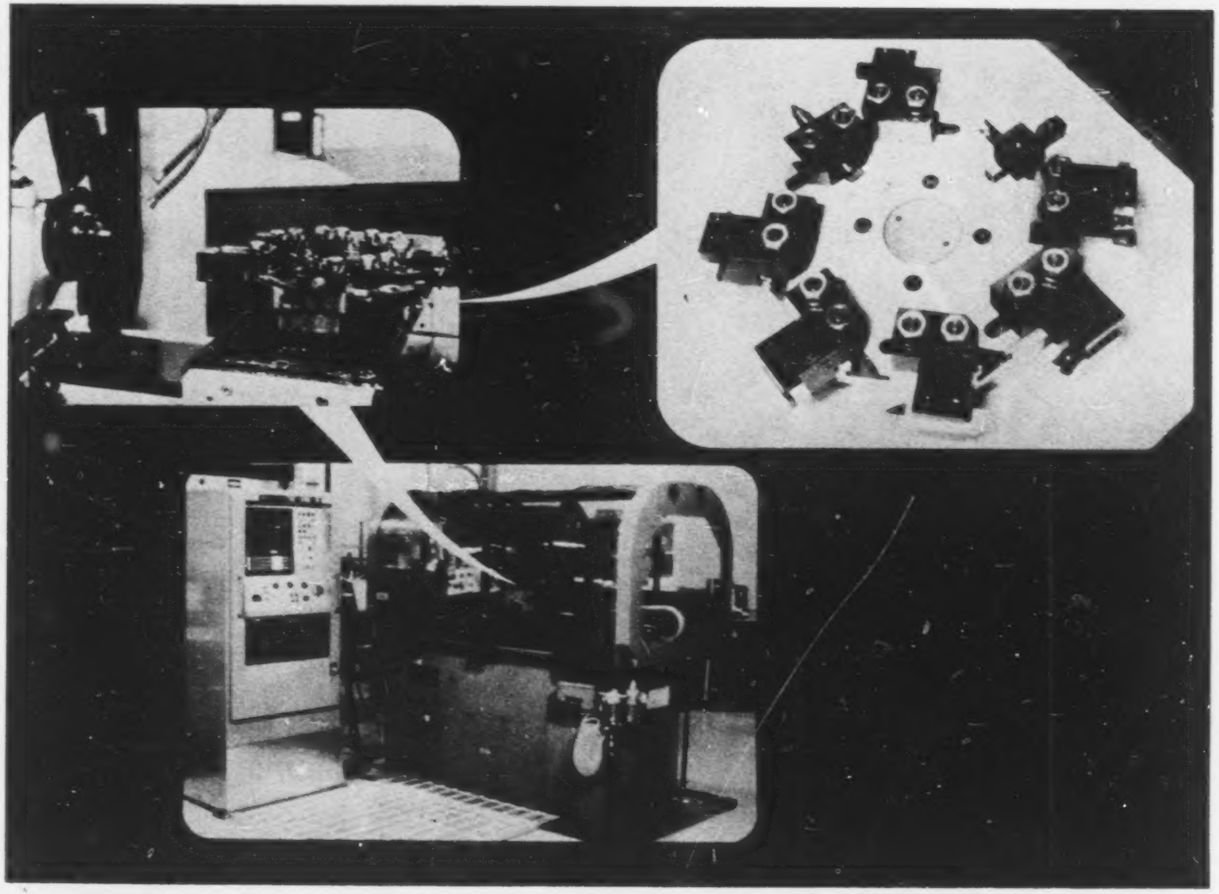
[Deleted.]

Senator JOHNSTON. What did the reporter for the New Yorker assume on megatonnage?

Mr. ROSER. I don't recall the exact figure, Senator Johnston, but those are the facts.

[Deleted.]





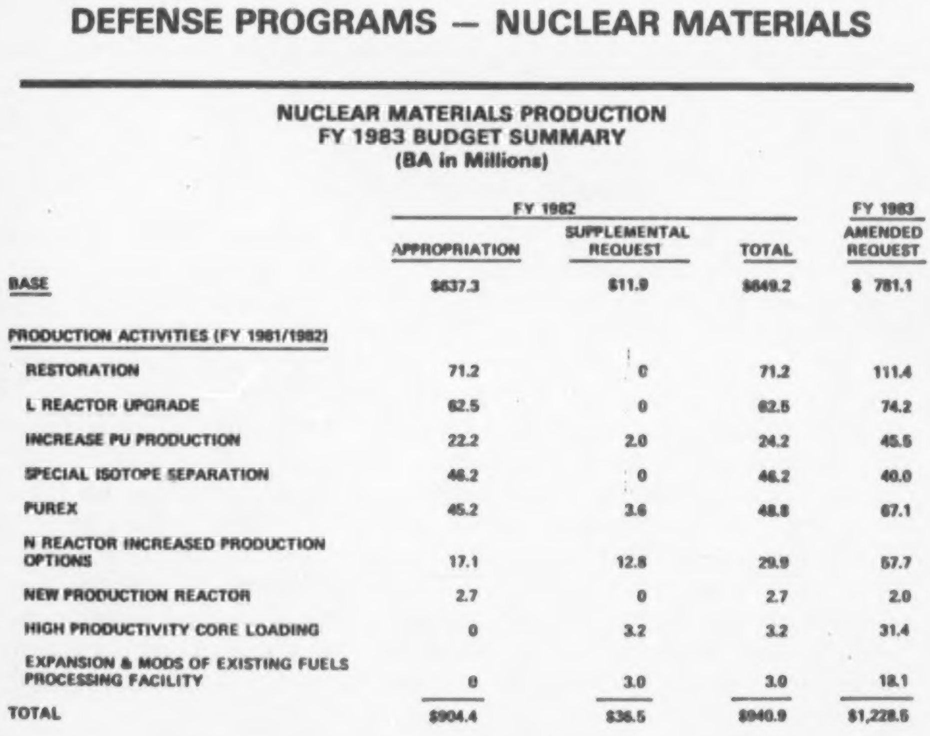
### PRODUCTION COMPLEX RESTORATION

Mr. Roser. Very briefly, I would like to show you some of the results of what we have done in modernizing the complex. The first picture is an old chucker lathe; it was located at our Bendix Kansas City plant. We replaced that with a numerically controlled lathe, and the second picture is what we were able to achieve in terms of production efficiency: a 30-percent reduction in maching time and setup time; a 20-percent reduction in rework and 20-percent increase in operating efficiency; plus those other items, increased tool life, product through-put, and reduced scrap.

### MATERIALS PRODUCTION

The mission of the materials production complex is the production of plutonium, tritium, and other radioisotopes for the military program, for our R. & D. programs, and then certain isotopes for industry and medicine, such as americium and others. [Deleted.]

[Deleted.]



DEFENSE PROGRAMS — NUCLEAR MATERIALS

NUCLEAR MATERIALS PRODUCTION
FY 1983 BUDGET SUMMARY
(BA in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROPRIATION | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| BASE | $637.3 | $11.9 | $649.2 | $ 781.1 |
| PRODUCTION ACTIVITIES (FY 1981/1982) | | | | |
| RESTORATION | 71.2 | 0 | 71.2 | 111.4 |
| L REACTOR UPGRADE | 62.5 | 0 | 62.5 | 74.2 |
| INCREASE PU PRODUCTION | 22.2 | 2.0 | 24.2 | 45.5 |
| SPECIAL ISOTOPE SEPARATION | 46.2 | 0 | 46.2 | 40.0 |
| PUREX | 45.2 | 3.6 | 48.8 | 67.1 |
| N REACTOR INCREASED PRODUCTION OPTIONS | 17.1 | 12.8 | 29.9 | 57.7 |
| NEW PRODUCTION REACTOR | 2.7 | 0 | 2.7 | 2.0 |
| HIGH PRODUCTIVITY CORE LOADING | 0 | 3.2 | 3.2 | 31.4 |
| EXPANSION & MODS OF EXISTING FUELS PROCESSING FACILITY | 0 | 3.0 | 3.0 | 18.1 |
| TOTAL | $904.4 | $36.5 | $940.9 | $1,228.5 |

CHART 127

### MATERIALS PRODUCTION BUDGET REQUEST

This is the budget for nuclear materials production. Again, I will not go through the detail of it, but the items below the base program, for which we are requesting $781 million for 1983, are special intiatives that we have had to undertake in order to try to meet the production demands over the next stockpile period, which is 1982 to 1997.

# DEFENSE PROGRAMS
# DEFENSE NUCLEAR WASTE

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### DEFENSE NUCLEAR WASTE MANAGEMENT
### FY 1983 BUDGET REQUEST
(BA in Millions)

| | FY 1982 | | | FY 1983 |
|---|---|---|---|---|
| | APPROP. | SUPPLEMENTAL REQUEST | TOTAL | AMENDED REQUEST |
| INTERIM WASTE OPERATIONS | $232.0* | $2.0 | $234.0* | $281.3 |
| DECONTAMINATION AND DECOMMISSIONING | 4.1 | 0 | 4.1 | 12.8 |
| LONG-TERM WASTE MANAGEMENT TECHNOLOGY | 81.2 | 0 | 81.2 | 92.3 |
| TRANSPORTATION RESEARCH AND DEVELOPMENT | 6.9 | 0 | 6.9 | 7.0 |
| TERMINAL STORAGE | 39.1 | 5.0 | 44.1 | 125.4 |
| PROGRAM DIRECTION | 1.6 | 0 | 1.6 | 2.0 |
| TOTAL | $364.9 | $7.0 | $371.9 | $520.8 |

*INCLUDES $930,000 IN CAPITAL EQUIPMENT FUNDING AND $3,532,000 IN CONSTRUCTION FUNDING FOR IDAHO LANDLORD ACTIVITIES FOR COMPARABILITY PURPOSES ONLY.

**CHART 128**

DEFENSE WASTE MANAGEMENT

Very briefly, this is our waste management program budget. We are in the process of finalizing a waste form for the high-level waste stored at Savannah River. We hope to get on with that and start solidifying the waste that is there in borosilicate glass. As soon as we get that program underway, we will move to the Richland site and start a long-range program for the solidification of high-level wastes there.

Senator McClure, I am sure, is interested in the fact that the high-level waste stored at the Idaho National Engineering Lab is in the best shape for interim storage of the waste of any of the sites that we have. We are not overlooking that, but we believe since it is stable and is in good shape that that will be the last program we will attack. The message I really want to put across, Mr. Chairman, is that we are vigorously attacking the high-level waste program in the defense end of the business, and we believe that we have the solutions and want to proceed toward getting that program taken care of as we think it should have been.

Senator JOHNSTON. Is that liquid waste in interim storage?

Mr. ROSER. In Savannah River, a good part of the waste is liquid. In Idaho it is calcined waste, in a solid granular form. At Richland it is mostly liquid, although there are some solids in terms of sludges in the tanks that are there.

One item I will just touch on briefly and then I will wind up.

### BENEFICIAL USE PROGRAM

We are involved in a beneficial uses program. I had hoped to bring along a couple of exhibits, but I didn't bring them along. We are recovering krypton from fuel processing and we currently are using that krypton to manufacture powerless lights for emergency landing strips. It is a very dramatic thing to see. Krypton requires a little shielding, but not too much.

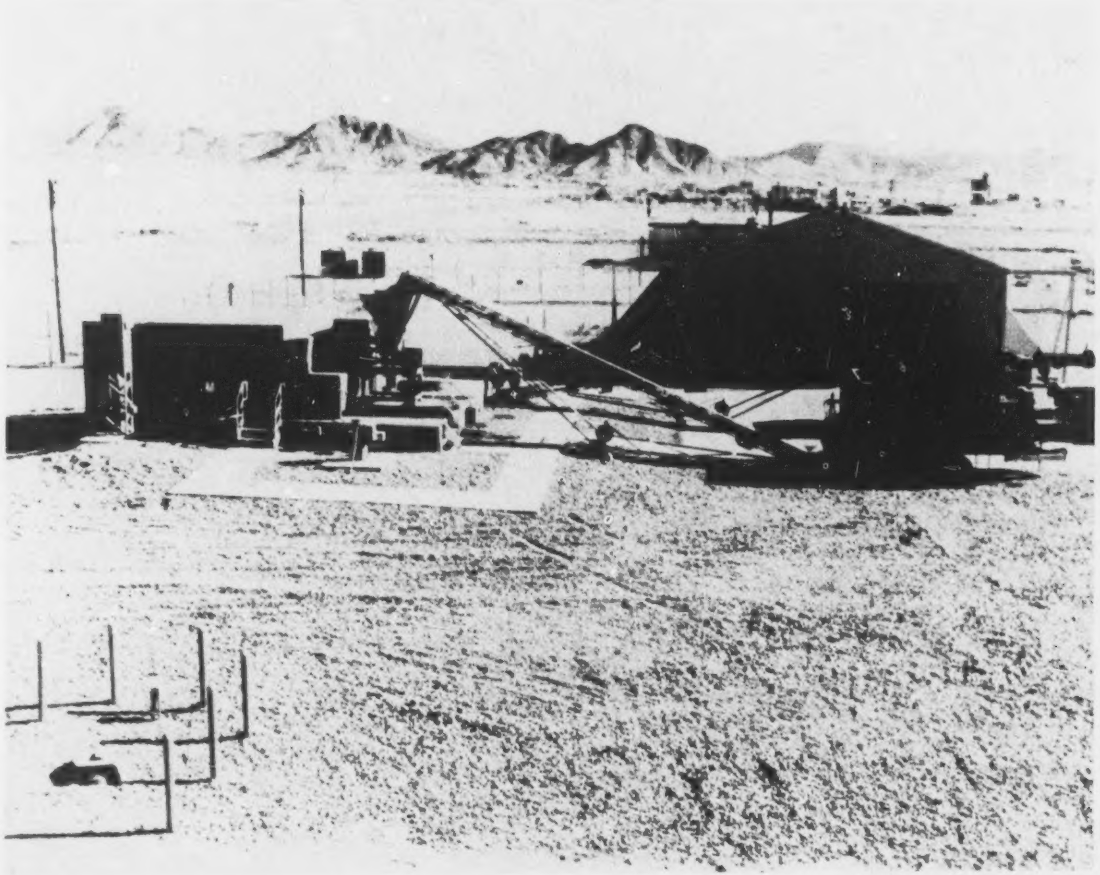

CHART 129

And this is a use of cesium 137 which is recovered from our chemical processing operation. This happens to be a sludge irradiator that Senator Schmitt and I dedicated out in Albuquerque a few years ago. This is a pilot model. We are engaged in some work with the city of Albuquerque and some other localities around the country, cooperating with them to build sewage and sludge irradiators. These facilities will permit the sludge to be irradiated with cesium 137 making it perfectly acceptable as fertilizer and also as a cattle food supplement. We are working with the New Mexico State University on a program to mix the product of this process with molasses and feed it to cattle, and it has worked very well.

Mr. Chairman, that concludes the items I wanted to cover with you. With your concurrence, I will ask Dr. Batzel to cover the special isotope separation program.

Chairman HATFIELD. Please proceed.

### SPECIAL ISOTOPE SEPARATION PROGRAM

Dr. BATZEL. Thank you, Mr. Chairman, members of the committee. We have about an 11-minute film, and I can give my briefing in a minute or so. We can look at the film, which is probably the most constructive information. It has to do with using lasers to reclaim low-grade plutonium by separating the isotopes of plutonium-240 and plutonium-241 from the plutonium-239, which is the fundamental isotope we use in nuclear weapons.

[Deleted.] The film will provide the background of the concept, and then, provided we have a minute at the end, we can give you the results.

Chairman HATFIELD. Thank you very much.

[CLERK'S NOTE: At this point, a short film was shown to the committee.]

### EXPERIMENT RESULTS

Chairman HATFIELD. Thank you, Dr. Batzel.

Dr. BATZEL. With your permission, I would like to introduce Dr. John Emmett, head of our laser program, and let him review briefly the results of the experiments.

Dr. EMMETT. [Deleted.]

[Deleted.]

### PRODUCTION REPLACEMENT REACTOR

Chairman HATFIELD. Doctor, let me ask one quick question on the SIS process and the need for what would be a $6 to $7 billion replacement production reactor.

Dr. EMMETT. First of all, there are two reasons you need production reactors. One is the production of tritium; the second is the production of plutonium. Plutonium does not decay away on any reasonable time scale and tritium does on a 12-year time scale. So there is always a need to produce tritium. The production reactors we have in the United States are very old and aging. I think it will be certainly appropriate to replace that tritium production capability in some reasonable time frame. I think that sort of plan has been presented to you.

With regard to the plutonium, the issue is, How much plutonium will be required? If the quantity required is in excess of what will be produced today with the existing production reactors due to their age and access in the existing military system to existing plutonium, you would have to build, in the future, new plutonium production reactors. The only other solution to that problem would be to take plutonium from the civilian sector and transfer it to the military sector, an approach which has just been soundly rejected by the Senate.

I think the issue of plutonium production reactor is probably one that doesn't have to be engaged for another 5 or 10 years if this SIS process is used. But certainly, a new production reactor for tritium will probably be required.

Chairman HATFIELD. Thank you very much.

Mr. Roser, do you have any other testimony you would like to have presented?

### SEPARATION PROCESSES

Mr. ROSER. I would just like to summarize, Mr. Chairman, in connection with the special isotope separation process; this is one of several. We have three systems we are looking at. Molecular isotope separation is being looked at at the Los Alamos Laboratory. There are also some possibilities in a plasma process. [Deleted.] And it is rather important to us in the continued cleanup of plutonium that is to be used in the stockpile.

I think that is all, Mr. Chairman. We will be responsive to your questions, and we will be very happy to return if you think that is desirable at a later time.

Chairman HATFIELD. Before you came in, Senator McClure, we found ourselves under the squeeze of this joint session and the vote. So I would suggest what we do is to submit questions—I have some 90—and have the Department respond to those questions, and then, if necessary, after reviewing the answers, possibly call these gentlemen back for more information. That might, perhaps, expedite this hearing.

Senator MCCLURE. Would it be possible to ask a few questions now?

Chairman HATFIELD. Yes; I am going to turn the gavel over to you.

Senator MCCLURE. I will do it in whatever manner you prefer, Mr. Chairman.

Chairman HATFIELD. First, if you want to remain, if any of the subcommittee members remain rather than go to the joint session, that is fine. I have a commitment I must keep. I would certainly be very happy to turn the gavel over and let you gentlemen remain. But I will have some questions to submit to you in writing, and other members of the committee who are not present may have some also. But if anyone would like to remain and carry on the hearing, that is all right.

Senator JOHNSTON. I understand it won't be until 3:15.

Senator MCCLURE. The joint session is 3:30 and we are to muster a march at 3:10.

### URANIUM ENRICHMENT BY LASER ISOTOPE SEPARATION

Senator JOHNSTON. Maybe 2 or 3 minutes of questions.

What does this tell us about uranium enrichment by laser separation?

Mr. ROSER. There is a separate program, Senator Johnston, on uranium separation.

[Deleted.]

### HTGR PRODUCTION REACTOR

Senator JOHNSTON. You will need a new production reactor, I guess, at least for tritium. What consideration has been given to the HTGR as a production reactor?

Mr. ROSER. Senator, regarding the new production reactor, we had a very extensive technical study done of several types of reactors, including the LMFBR and the type of reactor that we have at Savannah River, which is a low-temperature, heavy-water-moderated reactor and a high-temperature, heavy-water-moderated reactor. And we have a very extensive collection of data. We are currently engaged in a process that we believe will be the best to make a selection from among that group, including the HTGR. We plan to select a blue ribbon panel of outstanding people who are eminent in the field and present to them the data that have been accumulated by this study and the parameters which we think should be considered in the decision, such as the advisability of locating another reactor where we already have reactors sited. And we would ask that group to make a recommendation to me and I would then make a recommendation to the Secretary, probably sometime during fiscal year 1983.

### DOE REORGANIZATION

Senator JOHNSTON. Dr. Batzel, can you identify any cost savings or any efficiencies by moving you over to the Department of Commerce, Defense, or somewhere else, rather than the Department of Energy?

Dr. BATZEL. No, sir.

Senator JOHNSTON. Do you see any reason to assign you there, so far as you know?

Dr. BATZEL. I think there are reasons not to change our relationship with the defense program. This relationship has been one which has existed from the AEC through ERDA and into the Department of Energy. That particular relationship, I think, is important to maintain. I think one could maintain it within the Department of Commerce if such a decision were made. My view is that, with all due respect to my colleague, Dr. Wagner, I think keeping this part of the weapons program on the civilian side in the long term is the right thing.

Senator JOHNSTON. Would you agree then, if it ain't broke, don't fix it?

Dr. BATZEL. Yes, sir.

Chairman HATFIELD. I wonder if we could spread the time around.

### PLUTONIUM INVENTORY

Senator MCCLURE. Thank you very much.

You identified earlier there are some [deleted] materials that might be available for the laser separation cleanup. Is all of that in noncivilian programs?

Mr. ROSER. It is DOE-owned plutonium held for or used in DOE programs, Senator. It is material that was produced by the N reactor and other reactors at Hanford, and includes other DOE material.

Senator MCCLURE. And the N reactor was originally designed for the breeder reactor program, rather than the military program?

Mr. ROSER. The N reactor was operating so that plutonium would be available for any Government program, including the breeder program.

### STOCKPILE YIELD

[Deleted.]

Senator MCCLURE. What has happened to the old high-yield weapons?

Mr. ROSER. They have been retired.

Senator MCCLURE [presiding]. What happens to them when they are retired?

Mr. ROSER. When a weapon is retired, the special nuclear material is recovered and reused in new modern weapons.

Dr. WAGNER. The weapon is, in effect, destroyed.

Senator MCCLURE. And the materials are, in effect, either reused or placed in some other form and stored some place?

Mr. ROSER. That is correct.

Senator MCCLURE. Are they a part of this [deleted].

Mr. ROSER. They are not.

Senator MCCLURE. So you have a quantity of other materials that are available as well.

[Deleted.]

But the plutonium is essentially unrelated to the yield. [Deleted.] So the plutonium is recycled in the new production of lower yield weapons.

[Deleted.]

### NEW REPLACEMENT PRODUCTION REACTOR

Senator MCCLURE. And there will be a need for a replacement production reactor or additional production reactor facilities at some location at some time in the not too distant future?

Mr. ROSER. We believe that for several reasons, Senator. One, the reactors that currently produce tritium, and the only ones that do produce tritium, at Savannah River will soon be 40 years old and at the end of what is considered their lifetime. We are solely dependent for tritium on those reactors. We believe it would be prudent management to have another source of tritium.

Senator MCCLURE. If there is no production reactor—you need to produce tritium at some facility in order to maintain the current level of weapons capacity; is that correct?

Mr. ROSER. Yes, sir.

Senator MCCLURE. It isn't associated necessarily with an increased level of weapons capacity.

Mr. ROSER. We have to produce the tritium every day. Tritium decays about 5.5 percent a year, and if you don't produce it and replace it, the stockpile yield does as was indicated on that chart. So we do have to continue to produce tritium as long as we have weapons in the stockpile.

Senator McClure. Thank you. That is all the questions I have at this time.

Senator Schmitt. Could I just ask one question, Mr. Chairman? You indicated that you are going to continue at least two of the laser isotope separation alternatives.

Mr. Roser. Yes.

Senator Schmitt. Probably at different levels of funding.

Mr. Roser. We will keep them going on a viable basis, Senator. We intend to continue until the two processes have had the opportunity to demonstrate success, essentially.

Senator Schmitt. Plus the fact there is a different technology being developed at Los Alamos relative to the Livermore process.

Mr. Roser. That is right. It may well be in the future that it would be desirable to have a plant of each kind because they use different approaches. So we think it is necessary to continue the development of that technology regardless of which of the technologies we choose for a production process.

Senator Schmitt. And there is still some scale-up question in both processes.

Mr. Roser. In all of the processes. That is why we have not made a selection and don't intend to make a selection until we are satisfied that the technology problems have all been solved.

Senator Schmitt. Thank you.

### REDUCTION IN WEAPON YIELDS

Senator Johnston. Mr. Roser, could you tell me about why we have come down in the yield of our weapons so dramatically?

Mr. Roser. Yes, Senator. I think the philosophy that we have pursued—and Dr. Wagner could probably comment on this better than I can—but in the early days we built extremely large weapons with extremely large yields and we were just buying a big bang. Subsequently, we have advanced in technology and today we are developing weapons delivery systems that are much more accurate. We try to have yields that are no higher than the yields which the military feels are necessary for a specific target. [Deleted.]

[Deleted.]

Senator McClure. Would you yield on that?

Senator Johnston. Yes.

Senator McClure. To me there is one factor missing in the public debate on not only the accuracy question, but we so often get lost in terms of numbers of weapons we have, numbers of warheads, and not the ability to deliver those warheads on target. Because before numbers become important, you have to assume you have both reload capability and reload and refire them, which, I think, is a critical factor in the equation.

Dr. WAGNER. The discussion in the press on the numbers has been appalling. DOD soon will put out an unclassified fact sheet that says as much of what Herm Roser said with his charts as we can say in an unclassified way about the size of the U.S. stockpile over the years. I hope that the press will make use of that.

Senator MCCLURE. We are looking at deliverability in two contexts. One is the theoretical and the other is in the context that we will never strike first.

[Deleted.]

### ADDITIONAL PREPARED QUESTIONS FOR THE RECORD

Senator MCCLURE. There will be other questions, as Chairman Hatfield indicated, submitted for the record for your response. And Senator Schmitt has some questions as well.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY SENATOR HATFIELD

### General Questions on DOE's Defense Programs

Question: On page 2 of your prepared statement, you indicate that being a separate entity within the Commerce Department "will work." Does this mean you support reorganization - how do you feel about it and what are your concerns?

Answer: Let me start by addressing my concerns. My primary concern is that the Defense Programs organization stay together as an integrated unit, regardless of wherever it may be placed in a reorganization. In order for our functions to be adequately and efficiently performed as they have been over the last several decades, our Field Offices, laboratories, test facilities, weapons production complex and nuclear materials production facilities must remain within one management organization. I have worked very hard over the last several months to assure that our current organizational structure with all of its elements will remain an integral unit. Further, it should have a degree of independence in representing the interests of the country, apart from the Department of Defense point of view. I believe that the proposal made by the Administration will achieve these ends. That is why I say I believe it would work.

My other and somewhat less important concern is that any change, to some extent, tends to be disruptive. *DELETED* *DELETED* I, my staff, and all those engaged in the Defense Programs effort in the field will have to work very hard to minimize the effects of any disruptions brought about through a reorganization.

*DELETED*

(Questions and answers deleted.)

Question: Why isn't the real key to nuclear deterrence the development of superior technology for a much smaller number of warheads?

Answer: There is no individual key to nuclear deterrence. The concept of deterrence is based on our adversary's perception of our ability to do unacceptable damage to his resources. This perception depends on many factors such as number of warheads, number and mix of delivery systems, throw weight, accuracy, target structure, etc. Superior technology plays a role in each of these areas but in and of itself does not guarantee deterrence.

(Question and answer deleted.)

Question: Another concern we have is DOE's supplier relationship with the DOD. Often the DOD delivery systems encounter technical problems and delays, but DOE is not allowed to adjust its schedules to minimize overall Federal costs. What steps should the subcommittee take to resolve this problem?

Answer: The DOE relationship with the DOD is an interactive and well-coordinated approach to meeting the national nuclear weapons requirement. While program milestones and delivery dates can vary substantially based on technical or funding issues, there is a general and free exchange of information between the assigned DOD program offices and DOE production elements with a coordinating role exercised through the Military Liaison Committee to ensure individual program coordination. It should be recognized, however, that when a delivery system schedule is extended, it is often less costly to the DOE to maintain the planned production rate rather than stretching out or interrupting production. In each case of scheduling discontinuities, the DOE recommends adjustments to production schedules only after reviewing the total weapons complex workload and resource implications to ensure a minimum budget and multisystem impact.

With respect to subcommittee actions, we believe that adequately funded programs subjected to responsible management by the DOD and DOE are the best means of ensuring least cost to the Federal Government.

We also suggest continued close coordination and time phasing between Energy and Water Development Appropriation Subcommittee actions and those of the Armed Services Authorization Committee to ensure a well harmonized overall program.

## Atomic Energy Defense Activities Appropriations

Question: Why is the Department requesting a single appropriation account for its defense activities rather than the traditional accounts for Operating Expenses and Plant and Capital Equipment?

Answer: It was decided that for budget clarity and flexibility, all of the resources devoted to Atomic Energy Defense Activities should be combined into a single account. However, the Department will continue to track, report and control this account by the operating expenses, capital equipment and plant categories.

Question: Provide a schedule showing GSO balances for this account by program for 1981, 1982 and 1983.

Answer: The GSO balances for this account by program are shown in the following table.

Atomic Energy Defense Activities
GSO Balances
(Dollars in Thousands)

| Operating Expenses | FY 1981 (Actual) Ending GSO | FY 1982 Estimated Ending GSO | FY 1983 Estimated Ending GSO |
|---|---|---|---|
| Naval Reactors Development | $ 127,826 | $ 125,611 | $ 105,411 |
| Weapons Activities | 559,976 | 642,250 | 791,850 |
| Inertial Confinement Fusion | 34,068 | 28,236 | 28,236 |
| Verification & Control Tech. | 9,171 | 10,076 | 11,476 |
| Materials Production | 115,959 | 120,947 | 141,667 |
| Defense Waste Management | 42,616 | 20,657 | 25,234 |
| Nuclear Materials Security & Safeguards | 24,140 | 22,164 | 22,164 |
| Security Investigations | 690 | 90 | 90 |
| Total Operating Expenses | $ 914,446 | $ 970,031 | $1,126,128 |
| Plant & Capital Equipment | | | |
| Naval Reactors Development | $ 97,481 | $ 112,474 | $ 121,274 |
| Weapons Activities | 274,189 | 396,181 | 449,840 |
| Inertial Confinement Fusion | 65,488 | 73,619 | 30,890 |
| Verification & Control Tech. | 618 | 618 | 618 |
| Materials Production | 249,153 | 270,944 | 329,324 |
| Defense Waste Management | 70,646 | 79,095 | 184,338 |
| Nuclear Materials Security & Safeguards | 1,938 | 1,961 | 2,661 |
| Security Investigations | 0 | 0 | 0 |
| Total Plant & Capital Equipment | $ 759,513 | $ 934,892 | $1,118,945 |
| Total Atomic Energy Defense Activities | $1,673,959 | $1,904,923 | $2,245,073 |

Question: Provide a schedule showing inventory balances for this account by programs, with details as to the inventory classification and changes for 1981, 1982 and 1983.

Answer: The inventory balances for this account are shown in the following table.

## Atomic Energy Defense Activities
Changes in Inventories
(Dollars in Thousands)

| | FY 1981 | | | FY 1982 | | | FY 1983 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Beginning Balance | Change | Ending Balance | Beginning Balance | Change | Ending Balance | Beginning Balance | Change | Ending Balance |
| Weapons Activities | | | | | | | | | |
| Special Reactor Materials .. | $ 25,578 | $ 8,782 | $ 34,360 | $ 34,360 | $ 11,329 | $ 45,689 | $ 45,689 | $ 13,362 | $ 59,051 |
| Other Special Materials .... | 11,771 | 1,188 | 12,959 | 12,959 | 7,144 | 20,103 | 20,103 | 8,365 | 28,468 |
| Special Process Spares ..... | 962 | 214 | 1,176 | 1,176 | 175 | 1,351 | 1,351 | 210 | 1,561 |
| Subtotal Weapons Act. .... | 38,311 | 10,184 | 48,495 | 48,495 | 18,648 | 67,143 | 67,143 | 21,937 | 89,080 |
| Materials Production | | | | | | | | | |
| Special Reactor Materials .. | 129,842 | 20,874 | 150,716 | 150,716 | 23,855 | 174,571 | 174,571 | 38,050 | 212,621 |
| Other Special Materials .... | 3,916 | 431 | 4,347 | 4,347 | 0 | 4,347 | 4,347 | 530 | 4,877 |
| Special Process Spares ..... | 4,050 | 2,217 | 6,267 | 6,267 | -70 | 6,197 | 6,197 | 4,390 | 10,587 |
| Subtotal Materials Prod. . | 137,808 | 23,522 | 161,330 | 161,330 | 23,785 | 185,115 | 185,115 | 42,970 | 228,085 |
| Naval Reactors Development | | | | | | | | | |
| Special Reactor Materials .. | 21,840 | 657 | 22,497 | 22,497 | 500 | 22,997 | 22,997 | 400 | 23,397 |
| Fuel Fabrication ........... | 15,461 | 3,911 | 19,372 | 19,372 | 3,325 | 22,697 | 22,697 | -1,000 | 21,697 |
| Special Process Spares ..... | 21,786 | 3,547 | 25,333 | 25,333 | 7,100 | 32,433 | 32,433 | 6,600 | 39,033 |
| Subtotal Naval Reactors Development ............ | 59,087 | 8,115 | 67,202 | 67,202 | 10,925 | 78,127 | 78,127 | 6,000 | 84,127 |
| Defense Waste | | | | | | | | | |
| Special Process Spares ..... | 8509 | 55 | 8,564 | 8,564 | 5 | 8,569 | 8,569 | 220 | 8,789 |
| Total Inventories (Excl. . Common Use Stores) ..... | $ 243,715 | $ 41,876 | $285,591 | $ 285,591 | $ 53,363 | $338,954 | $ 338,954 | $ 71,127 | $410,081 |
| Common Use Stores 1/ ...... | | 0 | | | 6,234 | | | 22,480 | |

1/ Consistent with the FY 1982 Appropriations Act, the common use stores inventory balances from the Departmental Administration Appropriation are being merged into other appropriations within the Department, including Atomic Energy Defense Activities. However, the balances have not yet been assigned to specific programs.

Question: Provide a table showing all comparability adjustments from the 1982 appropriation for these appropriation accounts with an explanation as to why the changes are being proposed.

Answer: The $18.1 million comparability adjustment shown in this appropriation for FY 1982 includes $9.3 million for the transfer of the Community Assistance program from the Departmental Administration Appropriation to Weapons Program Direction. This transfer is considered appropriate since the Assistant Secretary for Defense Programs has management responsibilities for this activity and since the communities involved were originally established to support the weapons program and continue to do so to a great extent. The total comparability adjustment also includes $4.5 million for the transfer of the Idaho Landlord function from the Breeder Reactor program to the Defense Nuclear Waste program, and $1.6 million for the transfer of the Classification program from Departmental Administration to the Nuclear Materials Security and Safeguards program. The Idaho Landlord transfer is being proposed so that the landlord function can be budgeted for by the predominant program at the site, while the Classification transfer is an effort to have this important national security function budgeted for by Defense Programs where it has historically been managed. The remaining minor comparability adjustments are also being made to more accurately reflect the true costs associated with these programs. All of the comparability adjustments for this appropriation are shown on the following table.

Atomic Energy Defense Activities Comparability Adjustments
(Dollars in Thousands)

| | FY 1982 | |
|---|---|---|
| | BA/OBS | BO |
| Naval Reactors Development (OE) | | |
| Transfer to DA (Inspector General) ...... | $ -80 | $ -80 |
| Weapons Program Direction (OE) | | |
| ASDP from Departmental Administration (DA) | 900 | 900 |
| Regional Offices from DA ................ | 2,145 | 2,145 |
| Community Assistance from DA ............ | 9,335 | 9,335 |
| ICF Program Direction from ICF .......... | - | - |
| Transfer to Production & Surveillance ... | -4,450 | -4,450 |
| Transfer to DA (Inspector General) ...... | -367 | -367 |
| Total Weapons Program Direction ....... | 7,563 | 7,563 |
| Research & Development (OE) | | |
| Inventories from DA .................... | - | 312 |
| Inertial Confinement Fusion (OE) | | |
| Transfer to Weapons Program Direction ... | - | - |
| Testing (OE) | | |
| Inventories from DA .................... | - | 935 |
| Production & Surveillance (OE) | | |
| Transfer From Weapons Program Direction . | 4,450 | 4,450 |
| Inventories from DA .................... | - | 2,120 |
| Total Production & Surveillance ....... | 4,450 | 6,570 |
| Materials Production (OE) | | |
| Inventories from DA .................... | - | 1,932 |
| Defense Nuclear Waste | | |
| Inventories from DA (OE) ............... | - | 935 |

| | FY 1982 | |
|---|---|---|
| | BA/OBS | BO |
| Idaho Landlord from Breeder Reactor (Interim) | | |
| OE | - | - |
| CE | 930 | 930 |
| PL | 3,532 | 1,428 |
| Subtotal Idaho Landlord | 4,462 | 2,358 |
| Total Defense Nuclear Waste | 4,462 | 3,293 |
| Nuclear Materials Security & Safeguards (OE) | | |
| Classification from DA | 300 | 300 |
| Classification Program Direction from DA | 1,278 | 1,278 |
| Security Alarms from DA | 266 | 266 |
| Transfer to Emergency Preparedness | -125 | -125 |
| Total Nuclear Materials Security & Safeguards | 1,719 | 1,719 |
| Security Investigations from DA (OE) | - | - |
| Subtotal Operating Expenses | 13,652 | 19,886 |
| Subtotal Capital Equipment | 930 | 930 |
| Subtotal Plant | 3,532 | 1,428 |
| Total Comparabilities | $ 18,114 | $ 22,244 |

Question: Your employment level at Headquarters for FY 83 is essentially the same as FY 82 and yet the request for FY 83 is slightly higher. Please provide a breakdown comparing FY 82 and FY 83 which includes salaries, benefits, travel, and other personnel services. Please provide a similar breakdown for each office within the Headquarters item.

Answer: It is true that the Headquarters employment level remains relatively constant from FY 1982 to FY 1983 while the funding level increases slightly. However, the FY 1982 funding level is not comparable to FY 1983 because of current year shortfalls that resulted from underfunding base salaries and benefits in FY 1982. For the most part the negative funding impacts occurred during the realignment of programs and personnel from Nuclear Energy and Departmental Administration to Defense Program organizations. A reprogramming has been requested to cover these personnel funding shortages from current program availability. A summary breakdown of Headquarters personnel cost and similar detail by Headquarters' offices is show below.

Summary of Headquarters' Offices

| Item | FY 1982 | FY 1983 |
|---|---|---|
| Base Salaries | $12,557 | $13,811 |
| Other Personal Services | 823 | 954 |
| Benefits | 1,421 | 1,625 |
| Travel | 874 | 1,096 |
| Total | $15,675 | $17,486 |

## Detail by Headquarters' Offices

### Office of Military Application

| | | |
|---|---|---|
| Base Salaries | $ 4,245 | $ 4,460 |
| Other Personal Services | 285 | 330 |
| Benefits | 485 | 510 |
| Travel | 345 | 436 |
| Total | $ 5,360 | $ 5,736 |

### Office of Defense Waste and Byproducts Management

| | | |
|---|---|---|
| Base Salaries | $ 1,174 | $ 1,532 |
| Other Personal Services | 113 | 89 |
| Benefits | 141 | 190 |
| Travel | 149 | 189 |
| Total | $ 1,577 | $ 2,000 |

### Office of International Security Affairs

| | | |
|---|---|---|
| Base Salaries | $ 1,400 | $ 1,400 |
| Other Personal Services | 115 | 115 |
| Benefits | 170 | 170 |
| Travel | 115 | 115 |
| Total | $ 1,800 | $ 1,800 |

### Office of Nuclear Materials Production

| | | |
|---|---|---|
| Base Salaries | $ 1,490 | $ 1,600 |
| Other Personal Services | 90 | 180 |
| Benefits | 150 | 220 |
| Travel | 70 | 100 |
| Total | $ 1,800 | $ 2,100 |

### Office of Safeguards and Security

| | | |
|---|---|---|
| Base Salaries | $ 4,248 | $ 4,819 |
| Other Personal Services | 220 | 240 |
| Benefits | 475 | 535 |
| Travel | 195 | 256 |
| Total | $ 5,138 | $ 5,850 |

## Community Assistance

**Question: Why is the community assistance program being funded in the weapons program in FY 1983?**

Answer: Under Section 91 of the Atomic Energy Community Act of 1955, the DOE must provide assistance to specified units of local government in the communities associated with the Los Alamos National Laboratory (LANL) and the Oak Ridge complex. The statutory purpose of the assistance is to compensate the Los Alamos and Oak Ridge communities for their lack of an industrial or commercial tax base. As the primary mission of LANL and the Oak Ridge complex is to support the DOE's Defense Programs activities, Defense Programs has a keen interest in maintaining both good relations with local communities and assuring that a healthy and stimulating community environment is maintained to attract top quality technical and administrative personnel.

The transfer of the Community Assistance Program to the DOE's Defense Programs management was done to ensure timely and attentive administration of these local communities and their school systems. This ultimately benefits national security defense programs because it is in the best interest of our national security to have the best possible personnel involved in the DOE's defense programs.

## Budget Request

Question: Page I-F40 of the Budget Appendix shows Reimbursable program costs of $865,000,000 but offsetting collections of only $522,385,000. Why? Who is delinquent?

Answer: The financing of this FY 1982 reimbursable work, which is done primarily for the DOD, is comprised of $410 million of obligational authority provided by DOD work orders received but not obligated during FY 1981, with the balance of the obligational authority for DOD work orders to be received during FY 1982. Thus, the DOD is not delinquent, and all funds are projected to be obligated during FY 1982.

Question: Page 7 of the classified budget justification shows an unobligated balance brought forward of $488,550,000 for FY 1982 but nothing at the end of FY 1983. Why? Provide a breakdown of the $488 million with an explanation of why these funds weren't needed in FY 1982.

Answer: The $488,550,000 can be classified into two categories--reimbursable program and direct program. In both categories, the unobligated balances are being used to continue ongoing program activities initiated in FY 1981 and prior years.

The portion of the unobligated balance attributable to the reimbursable program amounts to approximately $410 million. These funds were provided by the DOD in FY 1981 and prior years to accomplish its mission requirements. Specifically, the DOD orders financed the procurement of weapons parts and assemblies; the conduct of weapons research, development, and testing activities; and naval reactor development.

The direct program portion of the total unobligated balances amount to $78.6 million and includes $30.0 million deferral as part of the FY 1981 Suppleme-mental Appropriation Act, P.L. 97-12. A breakdown of the unobligated balance in the direct program category follows:

UNOBLIGATED BALANCES

| Program | $ in Thousands |
|---|---|
| Weapons Activities | $ 56,551 |
| Nuclear Materials Production | 10,168 |
| Defense Waste Management | 9,210 |
| Naval Reactors | 1,078 |
| Verification and Control Technology | 12 |
| Nuclear Materials and Safeguards and Security | 1,571 |
| Total | $ 78,590 |

## Phase 3 Priorities

Question: Please provide a priority listing of your Phase 3 projects and projects presently in construction.

Answer: DOE budgets for and produces warheads for weapon systems required by the DOD and assigned to the DOE through the Military Liaison Committee. These assignments are based on weapon systems specified in the Presidentially approved NWSM. DOE does not prioritize these efforts. If such a priority listing is to be established, it would be a DOD function.

Question: Provide for the record a table detailing the status of each major construction project now underway. Show the project number, description of project, total estimated cost, authorization to date, appropriation to date, 1983 request, obligations to date, commitments and uncosted obligations to date, percentage of completion, and expected final costs. Group projects by location and include major subprojects in the restoration and other multilocation projects. Provide a numerical ranking in terms of importance by program.

Answer: See attached.

TABLE 1

RESEARCH AND DEVELOPMENT
WEAPONS ACTIVITIES
STATUS OF MAJOR CONSTRUCTION PROJECTS
As of January 31, 1982
(Thousands of Dollars)

| Project No. | Project Description | TEC | Authorization to Date | Appropriation to Date | 1983 Request | Obligations to Date | Commitments to Date | Uncosted Obligations | Percent of Completion | Expected Final Costs |
|---|---|---|---|---|---|---|---|---|---|---|
| Sandia National Laboratories | | | | | | | | | | |
| 78-16-d | Weapons Safeguards | $ 1,242 | $ 1,242 | $ 1,242 | $ - | $ 1,242 | $ 1,242 | $ 136 | 93 | $ 1,242 |
| 79-7-1 | Systems R&D Laboratory | 13,000 | 13,000 | 13,000 | - | 12,983 | 12,983 | 2,007 | 95 | 13,000 |
| 81-D-107 | Utilities and Equipment Restoration | 7,830 | 7,830 | 7,830 | - | 7,409 | 7,409 | 3,195 | 31 | 7,830 |
| 81-D-108 | Reactor Support Facilities | 10,000 a/ | 10,000 | 10,000 | - | 1,924 | 1,924 | 891 | - | 10,000 |
| 82-D-107 | Utilities and Equipment Restoration, Phase 3 | 76,000 | 10,800 | 5,800 | 11,500 | 4,100 | 4,100 | 4,100 | - | 76,000 |
| 82-D-144 | Simulation Technology Laboratory | 40,000 | 1,200 | 1,200 | - | - | - | - | - | 40,000 |
| Los Alamos National Laboratory | | | | | | | | | | |
| 78-16-d | Weapons Safeguards | 9,000 | 9,000 | 9,000 | - | 9,000 | 7,315 | 1,764 | 85 | 9,000 |
| 78-16-g | Radioactive Liquid Waste Collection System | 12,500 | 9,000 | 9,000 | - | 8,609 | 8,313 | 1,461 | 69 | 12,500 |
| 79-7-c | Proton Storage Ring | 21,800 | 19,000 | 19,000 | 2,800 | 12,890 | 6,419 | 8,198 | 25 | 21,800 |
| 81-D-107 | Utilities and Equipment Restoration | 7,890 | 7,890 | 7,890 | - | 7,638 | 6,152 | 3,810 | 80 | 7,890 |
| 82-D-107 | Utilities and Equipment Restoration, Phase 3 | 82,240 | 10,100 | 5,700 | 11,000 | - | - | - | - | 82,240 |
| 82-D-152 | New Detonator Facility | 17,200 a/ | 8,000 | 4,000 | - | - | - | - | - | 17,200 |
| Lawrence Livermore National Laboratory | | | | | | | | | | |
| 81-D-107 | Utilities and Equipment Restoration | 7,600 | 7,600 | 7,600 | - | 7,600 | 5,900 | 4,360 | 42 | 7,600 |
| 82-D-107 | Utilities and Equipment Restoration, Phase 3 | 77,000 | 10,100 | 5,700 | 10,500 | 5,700 | 1,060 | 5,658 | - | 72,300 |
| 82-D-150 | Weapons Material R&D Facility | 24,800 a/ | 2,500 | 2,500 | - | - | - | - | - | 24,800 |

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a/ Does not include PE&D cost

### TESTING
### WEAPONS ACTIVITIES
### STATUS OF MAJOR CONSTRUCTION PROJECTS
As of January 31, 1982
(Thousands of Dollars)

| Project No. | Project Description | TEC | Authorization to Date | Appropriation to Date | 1983 Request | Obligations to Date | Commitments to Date | Uncosted Obligations | Percent of Completion | Expected Final Costs |
|---|---|---|---|---|---|---|---|---|---|---|
| **Nevada** | | | | | | | | | | |
| 81-D-107 | Utilities and Equipment Restoration | $ 7,680 | $ 7,680 | $ 7,680 | $ - | $ 7,680 | $ 7,680 | $ 3,252 | 58 | $ 7,680 |
| 82-D-107 | Utilities and Equipment Restoration, Phase 3 | 76,760 | 11,000 | 11,000 | 15,700 | 11,000 | 10,182 | 10,900 | 1 | 76,760 |

(Table deleted.)

### TABLE 3

### INERTIAL CONFINEMENT FUSION
### WEAPONS ACTIVITIES
### STATUS OF MAJOR CONSTRUCTION PROJECTS
(Thousands of Dollars)

| Project No. | Project Description | TEC | Authorization to Date | Appropriation to Date | 1983 Request | Obligations to Date | Commitments to Date | Uncosted Obligations | Percent of Completion | Expected Final Costs |
|---|---|---|---|---|---|---|---|---|---|---|
| **Sandia National Laboratories** | | | | | | | | | | |
| 81-D-101 | Particle Beam Fusion Accelerator II | $ 40,650 | $ 36,750 | $ 25,000 | $ 2,750 | $ 21,607 | $ 21,607 | $ 18,711 | 10 | $ 40,650 |
| **Los Alamos National Laboratory** | | | | | | | | | | |
| 75-3-B | High Energy Gas Laser Facility - Antares | 62,500 | 62,500 | 62,500 | - | 60,088 | 56,434 | 4,515 | 85 | 62,500 |
| 80-AE-11 | Target Fabrication Facility | 14,300 a/ | 14,300 | 14,300 | - | 10,566 | 9,520 | 9,208 | 13 | 14,300 |
| **Lawrence Livermore National Laboratory** | | | | | | | | | | |
| 78-4-a | High Energy Laser Facility - NOVA | 185,000 a/ | 195,000 | 141,500 | 17,000 | 139,900 | 91,500 | 70,000 | 37 | 185,000 |

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a/ Does not include PE&D cost

## TABLE 4

## WEAPONS ACTIVITIES
## MAJOR CONSTRUCTION PROJECTS
## NUMERICAL RANKING

Scheduled below is a listing of weapons activities' major construction projects which are prioritized by numerical ranking in terms of importance. Prior-year projects are summarized by site in Tables 1, 2, and 3.

| Ranking | MAJOR CONSTRUCTION PROJECTS |
|---|---|
| 1 | Ongoing prior-year projects with current available funds a/ |
| 2 | FY 1983 General Plant Projects, VL (RD&T and P&S) |
| - | 83-D-124, Standard Missile-2 (SM-2) Warhead Production Facilities, VL a/ |

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a/ Weapons systems required by the Department of Defense (DOD) and assigned through the Military Liaison Committee are specified and based on the Presidentially approved Nuclear Weapons Stockpile Memorandum. The Department of Energy does not prioritize these efforts. Such prioritization would be a DOD function.

### NUCLEAR MATERIALS PRODUCTION
### Table 5
### STATUS OF MAJOR CONSTRUCTION PROJECTS

| Project/Description 1/ | TEC 2/ | Author. 3/31/82 | Approp. 3/31/82 | FY 1983 Request (B/A) | Obligations 3/31/82 | Estimated Obligations 9/30/82 | Uncosted Obligations 3/31/82 | Estimated 3/ Uncosted Obligations 9/30/82 | Commitments 3/31/82 | Estimated Commitments 9/30/82 | % Compl. 3/31/82 | Priority Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MULTISITE PROJECTS | | | | | | | | | | | | |
| 82-D-124 Restoration of Production Capabilities, Phases II and III, VL (Provides for upgrading facilities for the production of nuclear materials in support of the national defense programs) | $212,181 | 126,000 | 45,000 4/ | 87,700 4/ | 12,716 | 45,000 | 11,594 | 28,353 | 10,801 | 45,000 | 3% | 4 |
| Subprojects: | | | | | | | | | | | | |
| a. Replace Obsolete Plutonium-238 Facilities, HB-Line, Savannah River, South Carolina | 27,000 | 27,000 | 9,000 | 10,000 | 9,000 | 9,000 | 8,027 | 3,000 | 8,027 | 9,000 | 15% | |
| b. Steam and Power Production Facilities, Savannah River, South Carolina | 5,760 | 5,760 | 170 | 3,000 | 0 | 170 | 0 | 0 | 0 | 170 | 0% | |
| c. Reactor Fuel Handling Improvements (Part B), Savannah River, South Carolina | 10,000 | 10,000 | 3,500 | 4,000 | 0 | 3,500 | 0 | 2,500 | 0 | 3,500 | 0% | |
| d. N Reactor Control Systems, Richland, Washington | 8,850 | 8,850 | 50 | 4,000 | 50 | 50 | 43 | 33 | 50 | 50 | 0% | |
| e. N Reactor Coolant System Equipment and Instrumentation, Richland, Washington | 9,870 | 9,870 | 1,100 | 3,500 | 117 | 1,100 | 115 | 927 | 115 | 1,100 | 0% | |
| f. Enriched Uranium Processing, Y-12 Plant, Oak Ridge, Tennessee | 9,500 | 0 | 0 | 2,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0% | |
| g. Production Components Replacement, | | | | | | | | | | | | |
| 1) Savannah River, South Carolina | 34,681 | 11,180 | 11,180 | 20,901 | 1,000 | 11,180 | 1,000 | 9,180 | 1,000 | 11,180 | 2% | |
| 2) Richland, Washington | 7,580 | 7,580 | 1,350 | 3,650 | 287 | 1,350 | 257 | 919 | 257 | 1,350 | 4% | |
| h. Replace Production Support Equipment and Systems, | | | | | | | | | | | | |
| 1) Savannah River, South Carolina | 11,884 | 6,650 | 4,650 | 5,234 | 500 | 4,650 | 500 | 3,650 | 500 | 4,650 | 2% | |
| 2) Richland, Washington | 12,110 | 12,110 | 2,000 | 4,350 | 249 | 2,000 | 182 | 1,064 | 182 | 2,000 | 1% | |

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1/ There are no changes in the estimated final costs for these projects.
2/ Excludes CP&D and/or PE&D funds.
3/ Reflects placed contracts on which payments are not due until product is delivered.
4/ Excludes $2,000,000 temporarily reprogrammed to Project 81-D-143 that will be returned in FY 1983.

| Project/Description 1/ | TEC | 2/ Author. 3/31/82 | Approp. 3/31/82 | FY 1983 Request (B/A) | Obligations 3/31/82 | Estimated Obligations 9/30/82 | Uncosted Obligations 3/31/82 | Estimated 3/ Uncosted Obligations 9/30/82 | Commitments 3/31/82 | Estimated Commitments 9/30/82 | % Compl 3/31/82 | Priority Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| i. Replace Primary Heat Exchangers, Savannah River, South Carolina | 3,000 | 0 | 0 | 3,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0% | |
| j. Restore Deteriorated Canyon Cells and Cranes, Savannah River, South Carolina | 10,800 | 0 | 0 | 3,665 | 0 | 0 | 0 | 0 | 0 | 0 | 0% | |
| k. Renovation of High Voltage Transmission System Control and Monitoring, Savannah River, South Carolina | 18,000 | 0 | 0 | 4,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0% | |
| l. Replace Plutonium Precipitator Cabinets, Savannah River, South Carolina | 11,000 | 11,000 | 4,500 | 1,000 | 250 | 4,500 | 250 | 3,000 | 250 | 4,500 | 1% | |
| m. JB-Line Restoration, Savannah River, South Carolina | 8,500 | 8,500 | 3,000 | 5,000 | 250 | 3,000 | 250 | 1,000 | 250 | 3,000 | 1% | |
| n. Reactivation of $UF_6$-$UF_4$ Reduction Facility, Feed Materials Production Center, Fernald, Ohio | 10,300 | 7,500 | 4,500 | 5,800 | 1,013 | 4,500 | 970 | 3,080 | 170 | 4,500 | 0% | |
| o. Uranium Target Plating Line, Savannah River, South Carolina | 4,500 | 0 | 0 | 2,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0% | |
| p. Restoration of Special Materials Processing Facilities, Feed Materials Production Center, Fernald, Ohio | 8,846 | 0 | 0 | 2,600 | 0 | 0 | 0 | 0 | 0 | 0 | 0% | |
| 81-D-128 Restoration of Production Capabilities, Phase I, VL (Provides for the restoration of existing facilities for the production of nuclear materials in support of national defense programs) | 50,400 | 50,400 | 35,300 3/ | 10,100 | 32,600 | 35,085 | 22,995 | 7,833 | 23,018 | 35,300 | 31% | 3 |
| Subprojects: | | | | | | | | | | | | |
| a. Safety Improvements, Reactor Fuel Handling Facilities, (Part A) Savannah River, South Carolina | 4,000 | 4,000 | 2,500 | 0 | 2,500 | 2,500 | 1,898 | 220 | 1,898 | 2,500 | 15% | |
| b. Replacement of Obsolete Neptunium Oxide Facilities, HB-Line, Savannah River, South Carolina | 23,100 | 23,100 | 16,415 | 6,685 | 16,200 | 16,200 | 9,356 | 1,200 | 9,354 | 16,415 | 30% | |

3/ Excludes $5,000,000 temporarily reprogrammed to Project 81-D-143 that will be returned in FY 1983.

| Project/Description 1/ | TEC | 2/ Author. 3/31/82 | Approp. 3/31/82 | FY 1983 Request (B/A) | Obligations 3/31/82 | Estimated Obligations 9/30/82 | Uncosted Obligations 3/31/82 | Estimated 3/ Uncosted Obligations 9/30/82 | Commitments 3/31/82 | Estimated Commitments 9/30/82 | % Compl 3/31/82 | Priority Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| c. Reactor Heat Exchanger Replacement, Savannah River, South Carolina | 2,500 | 2,500 | 2,500 | 0 | 2,500 | 2,500 | 2,472 | 1,858 | 2,472 | 2,500 | 75% | |
| d. Reactor Equipment Replacement, Savannah River, South Carolina | 7,952 | 7,952 | 4,142 | 2,210 | 3,400 | 4,085 | 3,230 | 2,285 | 3,230 | 4,142 | 15% | |
| e. Separations Process Restoration, Savannah River, South Carolina | 2,340 | 2,340 | 1,700 | 640 | 1,700 | 1,700 | 1,630 | 450 | 1,630 | 1,700 | 34% | |
| f. Metallurgical Laboratory Expansion, Savannah River, South Carolina | 2,200 | 2,200 | 2,200 | 0 | 2,200 | 2,200 | 2,053 | 500 | 2,053 | 2,200 | 10% | |
| g. Boiler Control Improvements, Savannah River, South Carolina | 4,400 | 4,400 | 2,500 | 0 | 1,000 | 2,300 | 994 | 500 | 994 | 2,500 | 1% | |
| h. N-Reactor Equipment Replacement, Richland, Washington | 600 | 600 | 600 | 0 | 600 | 600 | 577 | 320 | 600 | 600 | 6% | |
| i. Support Facilities Restoration, Savannah River, South Carolina | 2,065 | 2,065 | 1,500 | 565 | 1,000 | 1,500 | 787 | 500 | 787 | 1,500 | 28% | |
| j. Partial Design - Replace Obsolete Plutonium-238 Facilities, Savannah River, South Carolina | 1,243 | 1,243 | 1,243 | 0 | 1,500 | 1,500 | 0 | 0 | 0 | 1,243 | 100% | |
| 82-D-126 Reactor Safety and Reliability, VL (Provides for additional improvements in the safety systems of the Savannah River plutonium production reactors and the N production reactor at Richland, Washington | 61,600 | 42,900 | 4,000 6/ | 7,000 | 3,600 | 4,000 | 2,921 | 1,550 | 921 | 4,000 | 11% | 10 |
| a. Savannah River | 49,800 | 37,650 | 2,400 6/ | 5,000 | 2,000 | 2,400 | 2,200 | 0 | 200 | 2,400 | 1% | |
| b. Richland | 11,800 | 5,250 | 1,600 | 2,000 | 1,600 | 1,600 | 721 | 1,550 | 721 | 1,600 | 52% | |
| SAVANNAH RIVER | | | | | | | | | | | | |
| 82-D-201 Special Plutonium Recovery Facility, JB Line, Savannah River, South Carolina (Provides a new plutonium recovery facility to preprocess and dissolve scrap and blend material) | 64,000 | 2,000 | 0 | 16,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0% | 12 |
| 81-D-142 Steam Transfer Headers, Savannah River, South Carolina (Provides an 8 mile long steam transfer header from the 400D Heavy Water Area to the 200F Separations Area) | 18,400 | 8,000 | 5,500 | 5,500 | 5,500 | 5,500 | 5,433 | 5,250 | 5,433 | 5,500 | 10% | 11 |

6/ Excludes $2,000,000 temporarily reprogrammed to Project 81-D-143 that will be returned in FY 1983.

| Project/Description 1/ | | TEC 2/ | Author. 3/31/82 | Approp. 3/31/82 | FY 1983 Request (B/A) | Obligations 3/31/82 | Estimated Obligations 9/30/82 | Uncosted Obligations 3/31/82 | Estimated 3/ Uncosted Obligations 9/30/82 | Commitments 3/31/82 | Estimated Commitments 9/30/82 | % Compl 3/31/82 | Priority Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81-D-143 | L Reactor Upgrade, Savannah River, South Carolina (Provides for upgrade of the L Production Reactor which was deactivated in 1968) | 134,000 | 115,000 | 97,500 9/ | 32,500 | 77,839 | 97,500 | 47,316 | 17,500 | 47,316 | 97,500 | 38% | 6 |
| 80-AE-2 | Replace Obsolete Processing Facilities, HB Line, Savannah River, South Carolina (Provides a new facility for the processing of plutonium-238 and the recovery of scrap material) | 19,000 | 19,000 | 16,000 | 3,000 | 16,000 | 16,000 | 3,598 | 800 | 3,598 | 16,000 | 68% | 8 |
| IDAHO | | | | | | | | | | | | | |
| 82-D-136 | Fuel Processing Facilities Upgrade, IFPF, INEL, Idaho (Provides for the upgrade of the Idaho Fuels Processing Facility which processes naval reactor fuels) | 46,000 | 40,000 | 10,500 7/ | 14,000 | 7,400 | 10,500 | 7,300 | 6,400 | 100 | 10,500 | 0% | 16 |
| 81-D-131 | Remote Analytical Facility Upgrade and Expansion, IFPF, INEL, Idaho (Provides for renovation of the existing facility, construction of a new hot cell and renovation of adjacent space for a decontamination development laboratory) | 28,500 | 28,500 | 16,000 8/ | 8,500 | 4,500 | 16,000 | 1,600 | 7,700 | 2,900 | 16,000 | 5% | 13 |
| 80-AE-3 | Steam Generation Facilities, INEL, Idaho (Provides a coal-fired steam generator facility to meet present and planned steam requirements for present and planned IFPF projects) | 28,500 | 28,500 | 28,500 | 0 | 27,600 | 28,500 | 23,000 | 16,900 | 24,400 | 28,500 | 7% | NA |
| 77-13-a | Fluorinel Dissolution Process and Fuel Receiving Improvements, IFPF, INEL, Idaho (Provides a new facility to receive, handle, store, and effect headend dissolution of a variety of irradiated fuels) | 199,400 | 199,400 | 189,400 | 10,000 | 180,500 | 189,400 | 62,900 | 32,500 | 141,700 | 188,800 | 66% | 9 |

7/ Excludes $3,500,000 temporarily reprogrammed to Project 81-D-143 that will be returned in FY 1983.
8/ Excludes $2,000,000 temporarily reprogrammed to Project 81-D-143 that will be returned in FY 1983.
9/ Includes $16,000,000 temporarily reprogrammed to Project 81-D-143 that must be returned in FY 1983.

| Project/Description 1/ | TEC 2/ | Author. 3/31/82 | Approp. 3/31/82 | FY 1983 Request (B/A) | Obligations 3/31/82 | Estimated Obligations 9/30/82 | Uncosted Obligations 3/31/82 | Estimated 3/ Uncosted Obligations 9/30/82 | Commitments 3/31/82 | Estimated Commitments 9/30/82 | % Comp 3/31/82 | Priority Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RICHLAND | | | | | | | | | | | | |
| 81-D-126 Pollution Abatement Facilities - Chemical Processing Plants, Richland, Washington (Provides pollution abatement facilities for the chemical processing plants to comply with applicable Federal, State, and local regulations) | 5,300 | 5,300 | 2,600 | 2,700 | 1,647 | 2,600 | 145 | 950 | 1,647 | 2,270 | | 7 |
| SAN FRANCISCO | | | | | | | | | | | | |
| 81-T-302 Advanced Isotope Separation Laboratory, Livermore, California (Provides laboratories, support equipment, and office facilities for research and development on laser isotope separation processes) | 25,000 | 25,000 | 17,800 | 7,200 | 14,000 | 17,800 | 8,095 | 8,153 | 14,000 | 17,800 | | 15 |

Table 6 - Defense Waste and Byproducts Management

| Project/Description | TEC | Authorization As of 3/31/82 | Appropriation As of 3/31/82 | FY 1983 Request (B/A) | Obligations As of 3/31/82 | Uncosted Obligations As of 3/31/82 | Commitments As of 3/31/82 | % Complete | Priority Ranking |
|---|---|---|---|---|---|---|---|---|---|
| RICHLAND | | | | | | | | | |
| 82-N-103 Waste Handling and Isolation Facilities, Richland, Washington | $ 34,450 | $ 34,450 | $ 10,000 | $ 7,000 | $ 2,065 | $ 2,061 | $ 476 | Design 100%<br>Const. 1% | 4 |
| 82-N-104 Waste Transfer Facilities, Richland, Washington ............ | 6,750 | 6,750 | 4,000 | 2,750 | 1,400 | 611 | 111 | Design 75%<br>Const. 5% | 1 |
| 82-N-107 Rail Replacement/Hanford Railroad, Richland, Washington . | 12,000 | 12,000 | 3,000 | 6,000 | 0 | 0 | 0 | Design 100%<br>Const. 0% | 2 |
| IDAHO | | | | | | | | | |
| 81-T-103 Sixth Set of Calcine Storage Bins, Idaho ...................... | 15,000 | 15,000 | 15,000 | 0 | 10,450 | 3,107 | 1,180 | Design 100%<br>Const. 3% | 5 |
| OAK RIDGE | | | | | | | | | |
| 81-T-104 Radioactive Waste Facilities Improvements, Oak Ridge National Laboratory, Tennessee . | 21,000 | 20,000 | 12,000 | 5,000 | 9,454 | 6,056 | 1,246 | Design 100%<br>Const. 42% | 3 |
| SAVANNAH RIVER | | | | | | | | | |
| 81-T-105 Defense Waste Processing Facility (DWPF), Savannah River, South Carolina ................ | 970,000 | 36,965 | 36,965 | 30,000 | 20,000 | 18,561 | 0 | Design 5%<br>Const. 0% | 7 |
| ALBUQUERQUE | | | | | | | | | |
| 77-13-f Waste Isolation Pilot Plant (WIPP), Delaware Basin, Southeast, New Mexico .......... | 651,700 | 157,600 | 118,000 | 110,800 | 110,870 | 19,464 | 11,881 | Design 24%[1/]<br>Const. 2%[1/] | 6 |

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[1/] Percentage of approved baseline for the project.

(Questions and answers deleted.)

Question: Why do you need to add 100 positions in research and development and how are these to be distributed?

Answer: As a part of our investment strategy for the future, one of our goals is to restore the nuclear weapons research, development, and testing employment to appropriate levels *DELETED* The investment strategy calls for a 15 percent increase in laboratory employment levels over the next few years.

*DELETED*

Question: When do you expect a final decision on the M-X basing mode? Doesn't that decision affect the warhead design and development?

Answer: We have been advised by the Under Secretary of Defense for Research and Engineering that the first 40 of 100 M-X missiles are planned to be emplaced in silos with the remaining 60 missiles to be deployed in an as yet unspecified basing mode, the selection of which is projected for mid-1983.

*DELETED*

Question: Explain briefly the reason for the DOD delay in resolving the M-X reentry vehicle/warhead decision. What were the issues, who made the final decision, and when? How does the delay affect the DOE program?

Answer: The DOD is best able to articulate the rationale for the delay in resolving the M-X reentry vehicle/warhead decision. Because the reentry vehicle/warhead is only one of many M-X subsystems *DELETED* capabilities, we presume that the DOD reentry vehicle/warhead decision naturally followed decisions on missile production and deployment.

*DELETED*

(Questions and answers deleted.)

Question: Why were no funds requested in FY 1983 for the four projects for which the Committee added funds in FY 1982? How much is required to continue these projects in FY 1983?

Answer: In developing the FY 1983 budget, it became a matter of priorities; i.e., program requirements versus fiscal restraints for the sake of the economy. A review of the total weapons budget needs indicated the necessity for reducing the request in construction. It was not possible to provide FY 1983 funding for these projects added by Congress in FY 1982.

The FY 1983 funding requirements to continue these projects are as follows:

FY 1983 FUNDING REQUIREMENTS
($ in Millions)

| | | |
|---|---|---|
| 82-D-144 | - Simulation Technology Laboratory, Sandia National Laboratories, Albuquerque | $ 6.0 |
| 82-D-150 | - Weapons Materials Research and Development Facility, Lawrence Livermore National Laboratory | 17.4 |
| 82-D-152 | - New Detonator Facility, Los Alamos National Laboratory | 13.1 |
| 82-D-153 | - Tritium Facility, Los Alamos National Laboratory | 1.6 |
| | Total | $38.1 |

Question: Please explain the reason why you reduced the FY 1983 budget request below FY 1982 levels for inertial confinement fusion. Provide a breakdown of the FY 1982 and FY 1983 ICF program operating expenses funding for LLNL, LANL, Sandia, KMS, Rochester, and other contractors for the various subprograms detailed in the budget request.

Answer: The FY 1983 budget submission with the amendment provides essentially the same dollar level as FY 1982. The breakdown by contractor follows:

($ in Millions)

| | FY 1982 | FY 1983 As Amended |
|---|---|---|
| LLNL | $ 51.7 | $ 49.7 |
| LANL | 36.9 | 37.0 |
| SNLA | 15.9 | 16.0 |
| KMS | 9.3 | 9.3 |
| UR | 5.4 | 5.4 |
| NRL | 2.7 | 2.6 |
| Others | 3.3 | 2.0 |
| Operating Level | $125.2 | $122.0 |
| FY 1981 Deferral | - 2.8 | |
| FY 1982 Appropriation | $122.4 | |

Question: What is the status of the study with the State of Colorado as to the Rocky Flats Plant? How much has been spent and how much is required to complete this effort? How is it being carried out?

Answer: The "Long-Range Rocky Flats Utilization Study" continues to proceed satisfactorily and should be completed by the end of FY 1982.

The Blue Ribbon Citizens Committee, appointed by the Governor and State Senate, has completed its review of "Socioeconomic Impact/ Alternate Mission Study" and "Relocation Cost Study." They are currently reviewing the "Demolition Cost Study and Risk Assessment."

The final three parts of the study are being drafted.

Most of the study efforts have been done by consultants and very little by DOE. A total of $3,418,000 has been set aside for this study and to date $3,000,000 has been obligated.

Question: Provide a breakdown of the employment and funding levels for each of the major production facilities, distinguishing between operating expenses and plant and capital equipment for FY 1982 and FY 1983.

Answer: See attached.

## AVERAGE PLANT EMPLOYMENT FOR THE WEAPONS PRODUCTION COMPLEX

| Production Plant | FY 1982 | FY 1983 |
|---|---|---|
| Bendix, Kansas City | 6,479 | 7,093 |
| General Electric, Pinellas | 1,409 | 1,482 |
| Los Alamos National Laboratory | 53 | 87 |
| Mason & Hanger, Pantex, Amarillo | 2,251 | 2,309 |
| Monsanto, Mound Facility | 1,508 | 1,518 |
| Rockwell, Rocky Flats | 3,443 | 3,698 |
| Sandia National Laboratories | 504 | 507 |
| Albuquerque Operations Office | 491 | 491 |
| Union Carbide, Oak Ridge | 4,489 | 4,887 |
| DuPont, Savannah River | 359 | 365 |
| Total Average Employment | 20,986 | 22,437 |

## FUNDING LEVELS FOR THE WEAPONS PRODUCTION COMPLEX (BA IN MILLIONS)

| | FY 1982 Appropriation | | | FY 1983 Budget Request | | |
|---|---|---|---|---|---|---|
| | Operating | Equipment | Const. | Operating | Equipment | Const. |
| Bendix, Kansas City | $ 381.7 | $ 8.9 | $ 46.7 | $ 481.6 | $12.1 | $ 86.1 |
| General Electric, Pinellas | 70.9 | 3.0 | 9.7 | 86.1 | 3.2 | 15.4 |
| Los Alamos National Laboratory | 6.4 | 1.0 | 5.7 | 8.7 | 1.4 | 11.0 |
| Mason & Hanger, Pantex, Amarillo | 97.1 | 3.0 | 63.6 | 116.1 | 3.2 | 67.3 |
| Monsanto, Mound Facility | 86.8 | 4.4 | 24.7 | 104.4 | 4.4 | 35.9 |
| Rockwell, Rocky Flats | 190.9 | 11.8 | 42.1 | 259.4 | 16.4 | 63.2 |
| Sandia National Laboratories | 75.1 | 5.6 | 5.8 | 87.1 | 6.3 | 11.5 |
| Albuquerque Operations Office | 68.5 | 8.3 | -48.8 | 72.0 | 12.0 | 0 |
| Union Carbide, Oak Ridge | 261.7 | 22.1 | 101.1 | 312.2 | 33.8 | 131.6 |
| Richland Operations Office | 0.2 | 0 | 0 | 0 | 0 | 0 |
| DuPont, Savannah River | 34.9 | 1.9 | 9.4 | 36.2 | 2.2 | 4.0 |
| Military Application | 10.5 | 0 | 0 | 10.0 | 0 | 15.7 |
| Nevada Operations Office | 0 | 0 | 11.0 | 0 | 0 | 0 |
| Lawrence Livermore National Laboratory | 0 | 0 | 5.7 | 0 | 0 | 10.5 |
| Total Funding | $1,284.7 | $70.0 | $276.7 | $1,573.8 | $95.0 | $452.2 |

Question: What measures are being used to determine the efficiency of production operations?

Answer:

*DELETED*

A primary consideration of the management complex is the effective and efficient management of resources. Objectives in the area include not only the portrayal of budgets as reasonable use of resources, but also the implementation of controls to assure maximum resource utilization. This requires the weapons complex to promote a common understanding of the cost concept at all levels of management and generate increased management support for cost awareness in decisionmaking in the management of the weapons complex; improve cost management; and optimize indirect support functions through effective cost management of applied resources. For example, in the engineering development process for a new weapon, process development and process engineering funds are spent to obtain the most efficient method to produce an acceptable product. During the production phase, economizing process development and improvement techniques take further advantage of newly developed methodology on a continuing basis.

Computer-controlled technology is helping us in every phase of the engineering research and development cycle, facilitating designs, automating fabrication, controlling test conditions, and aiding in design evaluation. The resulting improvement in our ability to predict the behavior of designs has reduced the time needed to transform them into finished hardware. This improved productivity has helped to meet increased commitments on schedule despite constrained manpower and funding levels.

(Question and answer deleted.)

Question: Provide a breakdown of the expected contractor staffing in FY 1982 and FY 1983 for each of the major plants and laboratories, including the test site, for the weapons program. Show how many are required for R&D, ICF, testing, and production and surveillance. Also show how many Federal employees are required and how these are distributed.

Answer: See attached.

## AVERAGE CONTRACTOR EMPLOYMENT

| | FY 1982 | FY 1983 |
|---|---|---|
| Research & Development | | |
| LLNL | 2,240 | 2,270 |
| LANL | 1,920 | 1,950 |
| SNLA | 3,330 | 3,370 |
| Other | 210 | 210 |
| Total | 7,700 | 7,800 |
| Testing | | |
| Nevada | 3,770 | 3,900 |
| LLNL | 680 | 741 |
| LANL | 694 | 710 |
| SNLA | 356 | 364 |
| Total | 5,500 | 5,715 |
| Inertial Confinement Fusion | | |
| LLNL | 558 | 509 |
| KMS Fusion, Inc. | 128 | 118 |
| University of Rochester | 72 | 68 |
| Naval Research Laboratory | 21 | 20 |
| LANL | 471 | 413 |
| SNLA | 190 | 167 |
| Total | 1,440 | 1,295 |
| Production & Surveillance | | |
| Bendix | 6,479 | 7,093 |
| Sandia | 504 | 507 |
| Rockwell | 3,443 | 3,698 |
| Monsanto | 1,508 | 1,518 |
| General Electric | 1,409 | 1,482 |
| Mason & Hanger | 2,251 | 2,309 |
| Albuquerque Operations | 491 | 491 |
| LANL | 53 | 87 |
| Oak Ridge Operations | 4,489 | 4,887 |
| Savannah River Operations | 359 | 365 |
| Total | 20,986 | 22,437 |

## WEAPONS ACTIVITIES FEDERAL MANPOWER

| | FY 1982 | FY 1983 |
|---|---|---|
| Program Direction | | |
| Headquarters | 129 | 128 |
| Albuquerque Operations | 542 | 531 |
| Nevada Operations | 248 | 251 |
| Community Assistance | 17 | 17 |
| Total | 936 | 927 |
| RD&T | | |
| AL | 205 | 89 |
| SAN | 7 | 7 |
| Total | 212 | 96 |
| P&S | | |
| AL | 608 | 612 |
| OR | 25 | 28 |
| SR | 8 | 10 |
| Total | 641 | 650 |
| Overall Total | 1,789 | 1,673* |

*FY 1983 total reflects transfer of the LANL guards from Federal to contractor employment.

Question: Provide a breakdown of the weapons program inventory accounts showing FY 1981 balances, FY 1982 and FY 1983 changes, and expected balances at the end of FY 1983.

Answer: See table on following page.

Question: Why is it necessary to purchase the two DC-9 aircraft? Provide details of the lease-purchase analysis.

Answer: The FY 1983 budget request includes $5.9 million to exercise purchase options under current lease agreements for two DC-9 jet aircraft.

The first DC-9 was acquired in August of 1979, the second DC-9 was acquired in December of 1979. Both were obtained under a 10-year lease/purchase-type contract by the agency's air-service contractor. The DC-9's are being flown some 1800 hours per year. One plane is used for the transportation of priority freight on the weekly scheduled coast-to-coast freight run and other special flights including transportation safeguard missions.

*DELETED*

The lease agreements contain a purchase option which can be exercised at the end of any month during the lease term. Monthly lease payments during the first 12-month period were $69,881 per month for each DC-9. Monthly payments for the current 12-month period are $63,881 per month. Credit to principal during the first year was approximately 40 percent and will be approximately 45 percent through September 30, 1982.

The best interest of the Government will be served if these planes are purchased at the earliest possible date. Continuation of lease payments beyond the proposed purchase date of October 1982 will result in further operating expenditures to the Government.

### CHANGE IN INVENTORIES
### Weapons Activities
(Budget Outlays in Thousands of Dollars)

| | FY 1981 Actual | | | FY 1982 | FY 1983 | |
|---|---|---|---|---|---|---|
| | Beginning Balance | Ending Balance | Change | Estimate of Change | Estimate of Change | Anticipated Balance |
| SPECIAL PROCESS SPARES: | | | | | | |
| LANL (PHERMEX) | $ 639 | $ 845 | $ 206 | $ 175 | $ 210 | $ 1,230 |
| OR | 5 | 5 | 0 | 0 | 0 | 5 |
| Total Special Process Spares | $ 644 | $ 850 | $ 206 | $ 175 | $ 210 | $ 1,235 |
| SPECIAL REACTOR MATERIALS: | | | | | | |
| BERYLLIUM | | | | | | |
| ARNL | $ 1 | $ - 60 | $ - 61 | $ 0 | $ 0 | - 60 |
| CH | 67 | 67 | 0 | 0 | 0 | 67 |
| ID | 0 | 0 | 0 | 0 | 0 | 0 |
| LLNL | 90 | 83 | - 7 | 0 | 0 | 83 |
| Total Beryllium | $ 158 | $ 90 | $ - 68 | $ 0 | $ 0 | $ 90 |
| BORON-10 | | | | | | |
| AL | $24,059 | $32,908 | $ 8,849 | $11,329 | $13,362 | $ 57,599 |
| ARNL | 35 | 35 | 0 | 0 | 0 | 35 |
| CH | 99 | 99 | 0 | 0 | 0 | 99 |
| ORNL | 1,223 | 1,223 | 0 | 0 | 0 | 1,223 |
| SNR | 4 | 4 | 0 | 0 | 0 | 4 |
| Total Boron-10 | $25,420 | $34,269 | $ 8,849 | $11,329 | $13,362 | $ 58,960 |
| Total Special Reactor Material | $25,578 | $34,359 | $ 8,849 | $11,329 | $13,362 | $ 59,050 |
| OTHER SPECIAL MATERIALS: | | | | | | |
| GOLD, SILVER, AND PLATINUM | | | | | | |
| AL | $ 8,173 | $ 9,259 | $ 1,086 | $ 5,454 | $ 6,215 | $ 20,928 |
| LANL | 1,919 | 2,015 | 96 | 520 | 680 | 3,215 |
| LLNL | 1,673 | 1,679 | 6 | 0 | 0 | 1,679 |
| NV | 0 | 0 | 0 | 0 | 0 | 0 |
| SR | 0 | 0 | 0 | 1,170 | 1,470 | 2,640 |
| Total Other Special Materials | $11,765 | $12,953 | $ 1,188 | $ 7,144 | $ 8,365 | $ 28,462 |
| STORES INVENTORY: | | | | | | |
| AL | N.A. | N.A. | $ 0 | $ 2,120 | $ 7,900 | $ 10,020 |
| LANL | N.A. | N.A. | 0 | 204 | 900 | 1,104 |
| LLNL | N.A. | N.A. | 0 | 204 | 1,000 | 1,204 |
| NV | N.A. | N.A. | 0 | 635 | 1,400 | 2,035 |
| SNL | N.A. | N.A. | 0 | 204 | 1,700 | 1,904 |
| Total Stores Inventory | N.A. | N.A. | $ 0 | $ 3,367 | $12,900 | $ 16,267 |
| TOTAL | $37,987 | $48,162 | $10,175 | $22,015 | $34,837 | $105,104 |

Question: Explain briefly the revisions being made in the weapons assembly/disassembly projects at Pantex and the status of this program.

Answer: Project 79-7-e, Production and Assembly Facilities, Pantex Plant, is currently under construction. This project includes seven assembly bays, two assembly cells, a linear accelerator bay for x-ray purposes, one HE service magazine, and seven production magazines.

Project 82-D-106, Weapons Assembly Facilities, Pantex Plant, and assembly bays and cells required for Project 78-16-a, Cruise Missile Production Facilities, Various Locations, are currently under design using the old Pantex bay design instead of the bay design used for Project 79-7-e. Project 82-D-106 includes seven assembly bays, one assembly cell, a linear accelerator bay, and the damaged weapons facility. Project 78-16-a includes four assembly bays, one assembly cell, a warehouse, and an electrical substation.
Our stockpile improvement program is currently being reassessed to determine the continued need for facilities requested in Project 82-D-108, Nuclear Weapons Stockpile Improvement, Various Locations. Currently, this project includes nine assembly bays and one assembly cell. This project will use the same facilities design as Projects 82-D-106 and 78-16-a.

We are currently initiating a testing program to reevaluate the potential release of hazardous materials in the event of an accident from the existing assembly cells. If the test results are satisfactory and the current cell design can be used instead of the new damaged weapons facility design, we anticipate additional cost savings for Projects 82-D-106, 78-16-a, and 82-D-108.

Question: Provide a detailed breakdown of your restoration Project 82-D-107, showing funding for ongoing subprojects, new starts, expected total costs, funding to date, and forward funding requirements. Explain the necessity and benefit of these subprojects.

Answer: Details of the utilities and equipment restoration subprojects included in Project 82-D-107 were not included in the data sheet as we considered this material to be too voluminous to be provided with the President's budget. We have assembled a separate package dealing exclusively with the FY 1983 restoration effort and this package has been provided to the Committee.

(Question and answer deleted.)

Question: What steps are being taken to improve DOE's management of your expanding construction program? Explain briefly for the record.

Answer: We have taken several steps to support the FY 1982 and follow-on fiscal years' construction programs. These include assigning additional DOE and contractor personnel to engineering and construction activities, expediting the selection of architect-engineer firms and assuring that the design effort for new construction progresses without delay, signing an interagency agreement with the U.S Army Corps of Engineers to provide contracting, design and construction management in areas where assistance is needed, and extensive participation by construction personnel in a comprehensive project management training program.

(Question and answer deleted.)

Question: What is its military priority with respect to other systems?

Answer: The DOD has not provided the DOE with an overall priority listing of all systems under development and in production.

(Questions and answers deleted.)

Question: How many tons of reactor-grade plutonium are available in the DOE inventory? How much of this will be used for blending?

Answer: The DOE inventory contains less than one metric ton of reactor-grade plutonium. Because of the high Pu-240 content (19 percent or greater), none of this plutonium is scheduled for blending.

*DELETED*

Question: Why have you reduced the Special Isotope Separation project? What are your plans to develop an SIS capability? What is the cost, schedule, and potential benefit?

Answer: The FY 1983 funding requested for the Special Isotope Separation program reflects our goal to select in early FY 1983, one of the candidate processes now under consideration for primary development. This will permit us to continue the program at the planned pace with less total funding than in FY 82.

The Department is conducting research and development on plutonium Laser Isotope Separation technology, with studies being conducted at Lawrence Livermore National Laboratory and Los Alamos National Laboratory.

*DELETED*

In FY 1983, DOE plans to select one of the LIS processes as a primary plutonium isotope separation concept. Based on the selected concept, Title I design of a plutonium production plant will be initiated in FY 1984. Plant construction would begin in FY 1986 with operation by FY 1989.

A preliminary estimate of the cost for R&D, design and construction of a production plant is in the range of one-half to one billion dollars.

*DELETED*

The principal benefit of the plutonium LIS production plant is augmentation of the weapon-grade plutonium stockpile.

*DELETED*

Another potential benefit can be realized by cleaning up the existing weapon grade stockpile to reduce exposure of personnel involved in the manufacturing and deployment of weapons.

(Questions and answers deleted.)

Question: What is the status of studies for a replacement production reactor? What are the results to date?

Answer: A joint DOD-DOE "Long-Range Nuclear Weapon Planning Analysis" was conducted during 1980. The results of that analysis was reported on July 15, 1980. The report recommended that DOE design and construct a Replacement Production Reactor. An evaluation study has been performed to develop a technical basis for selecting among the potential concepts. These efforts are aimed toward the selection of a concept and site during early FY 1983.

Question: How much would a replacement reactor cost? How much would it cost to rebuild?

Answer: A replacement production reactor and associated fuel cycle facilities would cost between 3 and 6 billion dollars in FY 1982 dollars, depending on the type of reactor selected.

The lifetime limiting feature of N Reactor is distortion of the graphite moderator due to the cumulative effect of high energy neutrons. It might be possible to rebuild the graphite moderator. While no definitive cost estimates have been made, the cost of rebuilding the moderator would be comparable to the cost of building a replacement reactor because of the radioactive environment in which the work would have to be done. The end product would be a reactor, comparable in cost with a new reactor, without all the upgraded safety and environmental features that a new reactor would have.

To replicate N Reactor, upgraded to today's standards, would cost approximately 3 billion dollars.

Question: What are the costs of the special nuclear materials for the individual weapon systems? Please provide these for the record.

Answer*: The cost of nuclear materials is not included in individual system cost estimates because these materials are reclaimed from systems as they are retired from the stockpile, reprocessed, and used to build new systems entering the stockpile. Inasmuch as there is an indeterminate ratio of reclaimed and newly produced materials used in current builds and since the materials will be reclaimed at the end of system life, it is inappropriate to allocate the cost of new material production against current builds. Tritium is the only nuclear material of which significant amounts are lost while in the stockpile.

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*Furnished by OMA-DP.

With a decay rate of approximately 5-1/2 percent per year, tritium must be periodically replenished. The cost to replace the decayed tritium over the lives of selected systems is reported annually to the Congress in the DOE Fiscal Year Budget Estimates in Support of DOD Programs.

(Question and answer deleted.)

Question: Explain the specifics of the allowance for inflation. How was this impact determined?

Answer: An analysis was made of existing and anticipated labor contracts, materials, supplies, etc. Labor costs are about 60 percent of the total program costs. Some of the labor cost increases are based on contracts with various labor unions. Other labor costs are based on our best estimate of agreements to be negotiated. Our most recent estimates for inflation at the production sites is as follows:

| Site | Percentage |
|---|---|
| Savannah River | 11.2 |
| Richland | 10.3 |
| Oak Ridge | 10.0 |
| Idaho | 13.0 |
| Other | 13.0 |

Question: What is the status of the L Reactor upgrade? When will you have firm estimates for this project?

Answer: The upgrade of L Reactor to the equivalent status of the three operating reactors at Savannah River began in FY 1981. Renovation and construction activities are progressing on schedule to enable startup by October 1, 1983. The project was approximately 50 percent complete at the end of the second quarter of FY 1982.

As noted in the submission, the December 1981, Schedule 44 data sheet provided a preliminary cost estimate for L Reactor upgrade of $184 million.

A proposed L Reactor Upgrade Cost estimate was developed on March 30, 1982. This estimate is still under review within DOE; however, Defense Programs expects to manage capital cost within the $134 million TEC identified in the Schedule 44 data sheet, dated December 1981. Other project related costs which were shown as $50 million in the December 1981 data sheet are presently estimated to be approximately $80 million. Issuance of a firm cost estimate, an updated schedule for the L Reactor upgrade, and the Project Management Plan is planned for mid-May 1982.

Question: Provide a breakdown of the 1982 and 1983 capital equipment funding by location. Provide a listing for any items expected to exceed $1.0 million.

Answer: Our capital equipment funding by location is as follows:

### Atomic Energy Defense Activities
### Materials Production
### Capital Equipment
### (BA in thousands)

| | FY 1982 Appropriation | FY 1982 Supplemental Request | FY 1983 Budget Request[1] |
|---|---|---|---|
| Albuquerque | $ 3,300 | $ 0 | $ 440 |
| Idaho | 7,500 | 0 | 6,400 |
| Oak Ridge | 3,000 | 1,100 | 5,300 |
| Richland | 14,000 | 3,300 | 24,700 |
| San Francisco | 20 | 0 | 0 |
| Savannah River | 35,180 | 200 | 62,160 |
| Headquarters | 0 | 0 | 8,700[2] |
| Total | $63,000 | $4,600 | $107,700 |

[1] Reflects Amended Request.

[2] Funding for the SIS program has not been split by location but will be shown at HQ until a process is selected.

In FY 1982 the Savannah River Operations Office is expected to purchase two major items of capital equipment. These are an annular dissolver for the processing canyons and an IBM 3081 computer. There are currently no other items of equipment planned for purchase with FY 1983 requested funding which are expected to exceed $1,000,000.

Question: Given the constraints on the Federal budget, why is it necessary to initiate projects 83-D-147 and 83-D-148 in fiscal year 1983? What is the impact of deferring these projects for consideration in future years?

Answer: The projects are needed to comply with the Federal Water Pollution Control Act of 1972 and the Resource Conservation and Recovery Act of 1976. Effluents can not be maintained within legal limits at the Savannah River Plant (SRP) with existing equipment. Chemical concentrations in waste waters from the Plant must be reduced by a factor of up to one hundred, the pH of liquid discharges adjusted, and toxic substances such as mercury removed.

The State of South Carolina has a "Notice of Violation" on file against the SRP for exceeding discharge limits. If corrective actions are deferred, there is a high probability that either the State or an outside environmental interest group will initiate judicial actions.

Question: Provide a priority listing for construction project funding in FY 1983.

Answer: Our construction project priority listing is:

| Priority | Project Number | Project Title | FY 1983 Request |
|---|---|---|---|
| 1 | 83-D-135 | General Plant Projects, various locations | $26,000,000 |
| 2 | 83-D-136 | Plant Engineering and Design, various locations | 2,000,000 |
| 3 | 81-D-128 | Restoration of Production Capabilities, Phase I, various locations | 10,100,000 |
| 4 | 82-D-124 | Restoration of Production Capabilities, Phases II and III, VL | 87,700,000 |
| 5 | 83-D-138 | PUREX Canyon and Dissolver Filter Systems Improvements, Richland | 4,250,000 |
| 6 | 81-D-143 | L Reactor Upgrade, Savannah River | 52,500,000 |
| 7 | 81-D-126 | Pollution Abatement Facilities - Chemical Processing Plants, Richland | 2,700,000 |
| 8 | 80-AE-2 | Replace Obsolete Processing Facilities, HB-Line, Savannah River | 3,000,000 |
| 9 | 77-13-a | Fluorinel Dissolution Process and Fuel Receiving Improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laborat ry, Idaho | 10,000,000 |
| 10 | 82-D-126 | Reactor Safety and Reliability, various locations | 7,000,000 |
| 11 | 81-D-142 | Steam Transfer Headers, Savannah River | 5,500,000 |
| 12 | 82-D-201 | Special Plutonium Recovery Facility, JB-Line, Savannah River | 16,000,000 |
| 13 | 81-D-131 | Remote Analytical Facility Upgrade and Expansion, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho | 8,500,000 |
| 14 | 83-D-180 | Facility Storage Modifications, various locations | $ 9,300,000 |
| 15 | 83-D-142 | Fuel Dissolver Off-Gas Transfer System, Idaho | 3,500,000 |
| 16 | 81-T-502 | Advanced Isotope Separation Laboratory, Livermore, California | 7,200,000 |
| 17 | 82-D-136 | Fuel Processing Facilities Upgrade, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho | 14,000,000 |
| 18 | 83-D-147 | Pollution Discharge Elimination, Savannah River | 1,000,000 |

| Priority | Project Number | Project Title | FY 1983 Request |
|---|---|---|---|
| 19 | 83-D-148 | Non-Radioactive Hazardous Waste Management, Savannah River | 1,000,000 |
| 20 | 83-D-146 | Water Pollution Control, Feed Materials Production Center, Fernald, Ohio | 1,400,000 |
| | | | $272,650,000 |

Question: How much of the $66,400,000 requested for project 82-D-124 will be actually committed to contracts by the prime contractors in 1983 and how much in 1984?

Answer: Of our original request for project 82-D-124, Restoration of Production Capabilities, Phases II and III, $62,900,000 is scheduled for commitment in FY 1983 to both outside and internal construction contractors. The remaining $3,500,000 will be committed in FY 1984.

The total additional funding requested in our amended budget, $21,300,000, is scheduled for commitment in FY 1983.

Question: Explain briefly the reason for the increase in total estimated cost of project 82-D-126 from $42,900,000 to $61,600,000.

Answer: The increased total estimated cost of project 82-D-126, Reactor Safety and Reliability, is due to escalation associated with the stretchout of the program that resulted from limited prior year funding, increased scope of the reactor simulator and operator training facilities for the Savannah River P, C, K, and L production reactor personnel, and addition of a new subproject at Richland "Design Basis Volcanic Eruption Protection" following the Mt. St. Helens eruption.

Question: Where is the $38,000,000 N Reactor revenues reflected in the budget request?

Answer: The revenues from N Reactor are included in "Miscellaneous Revenues" under the Departmental Administration appropriation section of the DOE budget request, and are not included in the Materials Production Budget.

## Defense Waste Plan

Question: Dr. Gilbert, we look forward to your report to Congress on a defense waste plan. Your efforts in this area are important in addressing the concern over the future costs of the program. Briefly discuss the magnitude of the waste problem and the projections of funding levels in the next five years.

Answer: As you are aware, the defense waste plan will cover the Administration's approach for permanent disposal of high level and transuranic waste. Permanent disposal of low level waste is already in effect through shallow land burial.

There are significant inventories of high level and transuranic waste at DOE sites, which we have accumulated over about 30 years in support of nuclear weapons development and production. A summary of the high level and transuranic waste inventories are shown in the attached charts.

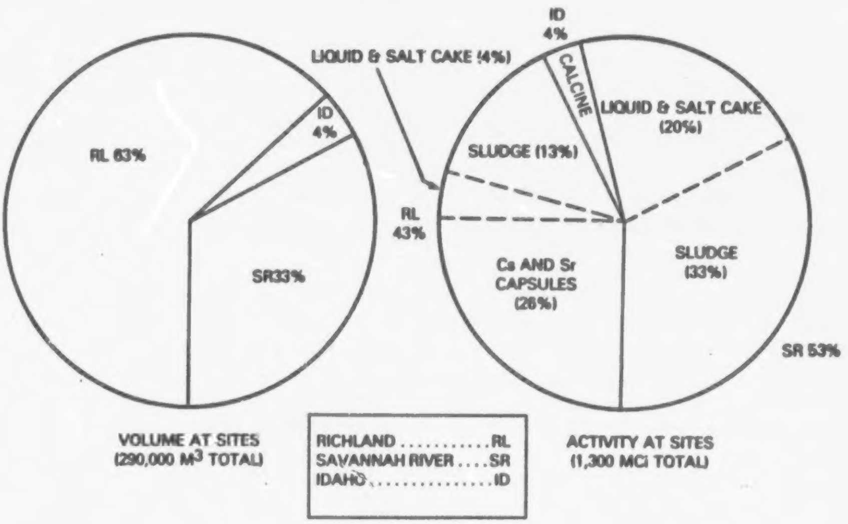
The approved Administration funding levels to manage the existing defense waste inventory and address the issue of long term disposal is as follows (Budget Authority, $ in Millions):

| FY 1982 | FY 1983 | FY 1984 | FY 1985 | FY 1986 | FY 1987 |
|---|---|---|---|---|---|
| $ 372 | $ 521 | $ 761 | $ 830 | $ 733 | $ 558 |

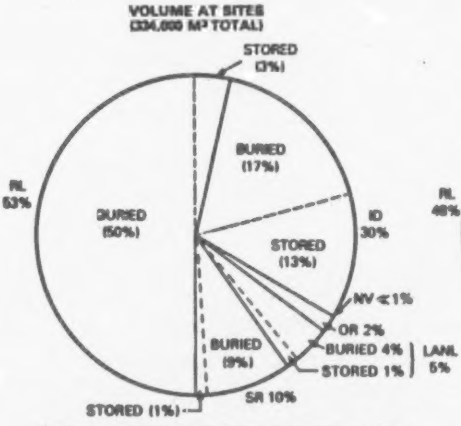
The above funding levels will be reviewed and adjusted as necessary as a part of the defense waste plan.

# DEFENSE PROGRAMS
# DEFENSE NUCLEAR WASTE

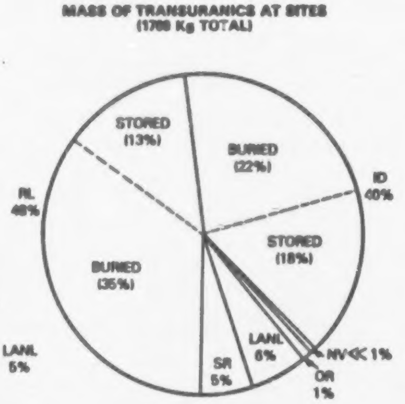
## DOE DEFENSE HIGH-LEVEL WASTE INVENTORY



## DOE DEFENSE TRANSURANIC WASTE INVENTORY



| SITE | % OF STORED | % OF BURIED |
|---|---|---|
| IDAHO (ID) | 69 | 21 |
| RICHLAND (RL) | 17 | 61 |
| LOS ALAMOS (LANL) | 7 | 4 |
| SAVANNAH RIVER (SR) | 4 | 12 |
| OAK RIDGE (OR) | 2 | 2 |
| NEVADA (NV) | 1 | < 1 |
| TOTALS | 61,000 $M^3$ | 273,000 $M^3$ |



EXCLUDES: HIGH-LEVEL WASTE (800 Kg)
SURPLUS FACILITIES (50 Kg)

## Replacement of Single Walled Tanks

Question: What is the status of your efforts to replace the single walled tanks at Richland and Savannah River with double tanks? What level of funding in FY 1982 and FY 1983?

Answer: At both sites, we continue to contain the high level waste safely. At Savannah River, 18 new high level waste tanks have been completed, and waste transfer from old tanks to new tanks will continue in FY 1983. As part of this effort, several innovative processes promising significant cost savings to the waste immobilization program (DWPF) will be demonstrated. These processes include the removal of certain constituents from the sludge and salt cake in the tank farm as part of the feed preparation to the DWPF, eliminating the requirement for a costly "stage two" of the DWPF. Waste concentration through evaporation is continuing. This program reduces costs and improves safety by minimizing the need for more tanks and results in less mobile waste. The FY 1982 funding for the above efforts is $22 million and remains the same for FY 1983.

At Richland, efforts have been underway since 1977 to stabilize and isolate all 149 old single shell tanks. All the old tanks were removed from active service in 1980. The tanks originally contained a liquid layer and a layer of precipitated sludge and salt cake. Operations to transfer the liquid layer were completed in November 1980. After evaporation to reduce volume, the liquid is now stored in new double shell tanks. Removal of the remaining interstitial liquid from the damp salt cake is underway using specially designed jet pumps.

As the old waste tanks are "stabilized" by the removal of all pumpable liquid, they are being isolated by sealing all apertures through which liquid might enter. By the end of 1982, it is planned to stabilize 49 tanks of which 22 will also be isolated. It is estimated that the stabilized tanks will retain their structural integrity to contain the sludge and salt crystals for at least 50 years. The program will be complete in 1988.

Funding for the above Richland efforts is $15 million and $12 million respectively for FY 1982 and FY 1983. The reduction reflects program priorities in the competition for limited funds. Waste management operations in direct support of PUREX restart have been given priority. We feel this is justified on the basis that waste has been pumped from the "worst tank farms" already.

## Transuranic Waste Facilities

Question: Briefly describe your efforts leading to a full scale facility for handling transuranic waste in Idaho? Why do you need design funds for two pilot plants?

Answer: The initial concept of the Transuranic Waste Treatment Facility (TWTF) caused us concern because of the cost. We are planning to modify the TWTF to reduce the cost of processing the stored transuranic waste at Idaho.

The Stored Waste Examination Pilot Plant, or SWEPP, will conduct experiments to develop and demonstrate techniques and equipment for non-destructive examination, and fissile material assay. Ultimately, we will be able to certify whether or not individual stored waste containers meet the WIPP Waste Acceptance Criteria. The stored waste that does not meet the WIPP Waste Acceptance Criteria will require processing. The Process Experimental Pilot Plant (PREPP) will conduct experiments to demonstrate an experimental approach of shredding, rotary kiln incinerator, and concreting to process the uncertifiable waste. The processed waste will then be returned to the SWEPP for certification and later shipment to the WIPP.

Although the two pilot plants are being funded and managed as separate projects, they will work together to achieve the ultimate objective of processing and disposing of the stored transuranic waste at INEL.

## Funding for Calcine Storage Bins

Question: Why are there no funds requested for the sixth set of calcine storage bins in Idaho?

Answer: The project does not require FY 1983 funding as appropriations through FY 1982 of $15.0 million equals project authorization and total estimated cost of $15.0 million.

## Sludge Irradiation Facility

Question: Describe your plans and the need for a sludge irradiation facility.

Answer: Treatment of municipal sewage sludge by cesium-137 gamma radiation to absorbed doses of 1 MRad satisfies U.S. Environmental Protection Agency requirements (40 CFR 257) for pathogenic disinfection. Sludge so treated is considered pathogenically safe for unrestricted beneficial use by municipalities as an alternative to more costly sludge disposal alternatives (landfilling, incineration, etc.). Irradiated sludge can be used by cities as a fertilizer or can be sold, partially offsetting the treatment costs.

The City of Albuquerque, New Mexico, has proposed, as part of a major sewage treatment upgrade, the disinfection of sludge by radiation with subsequent reuse by Albuquerque Parks Department. This proposal has been reviewed by EPA in an EIS and has been found to qualify as "innovative and alternative technology" and to be the preferred treatment option.

DOE has assisted Albuquerque under a negotiated cooperative agreement in evaluating this irradiation alternative and has verified irradiator operation with the Sandia Irradiator for Dried Sewage Solids (SIDSS) pilot plant.

The FY 1983 funding level would allow continued technical assistance to Albuquerque for irradiator design and construction with schedules determined by funding availability from the EPA Construction Grants Program and the City. The irradiator could begin to operate in FY 1986-1987.

The FY 1983 program also continues the development and fabrication, by Sandia National Laboratory, of a shipping cask for transporting approximately 1 MCi of encapsulated cesium-137 from Hanford, Washington, to the irradiator facilities. DOE plans to loan the source material to Albuquerque so that City's concerns over ultimate disposal of the cesium are alleviated. A final activity suported by the FY 1983 program involves registration of the cesium capsules from Hanford with the NRC as gamma sources meeting NRC's normal operation and accident scenario criteria.

## Potential Threat to Public

Question: Please provide a comparison of the potential threat to the public from continued storage of defense waste in its present form compared to the continued storage of spent fuel from civilian reactors by utility owners.

Answer: The respective safety records of both the Federal Government for the storage of defense waste and the utility owners for the storage of commercial spent fuel are excellent. Although defense waste and commercial spent fuel have slightly different thermal and radioactive properties, each have been managed in ways which protect public health and safety.

Commercial spent fuel has not been classified as waste and will represent a valuable energy resource when reprocessed.

## Decontamination and Decommissioning

Question: Explain specifically why the increase of $8,655,000 for decontamination and decommissioning for 1983 is needed and how the 1983 funds will be used.

Answer: The increased funding for decontamination and decommissioning is required to support activities for about 400 defense-related surplus facilities. Minimum funds, $5.2 million, were provided to maintain these facilities in a safe condition in FY 1982.

The FY 1983 request is based on meeting the program objectives to maintain surplus facilities in an occupationally and environmentally safe condition, as well as to progressively reduce the backlog of facilities. Program priorities stress identification of beneficial uses for materials, facilities and real property while reducing future maintenance costs and potential health effects. The long-term strategy is to identify the most cost-efficient approach in managing the facilities (return to use, if possible, as opposed to decommissioning) which is consistent with potential health and safety risks.

In FY 1983, resources are being requested for:

o Surveillance and Maintenance ($5,000,000) to prevent deterioration of facilities at Idaho and Oak Ridge National Laboratory and provide for repair of 100-Area reactor building roofs and the Strontium Semi-Works ventilation system at Hanford;

o Planning and Risk Assessments ($1,275,000) to obtain characterizational data on surplus facilities to identify beneficial uses and assess health risks; and

o Decommissioning Projects ($6,525,000)

- to decommission the Materials Test Reactor and decontaminate the Chemical Process Plant cells at Idaho National Engineering Laboratory;

- to complete decommissioning of the intermediate level waste transfer line at Oak Ridge National Laboratory;

- to complete decontamination of the 108-F laboratory to permit other uses, to initiate decommissioning of the 105-F production reactor (piping and hardware removal) and to initiate planning for the Strontium Semi-Works at Hanford;

- to continue work on the Special Metallurgical Building at Mound Facility; and

- to remove the concrete pad and contaminated sewer lines and associated soils at the New Brunswick Laboratory in New Jersey.

We are also planning to recover materials, such as metals, from surplus facilities for future beneficial use. This may require additional metal smelter equipment.

### Increase for Interim Waste Operations for Capital Equipment

Question: Why do you need an increase from $16,930,000 to $25,062,000 for capital equipment for interim waste operations? Provide for the record a listing of any items expected to cost over $1.0 million.

Answer: An increase in capital equipment funding has been requested for all sites. Most of the equipment at these sites is 20-30 years old and has reached a state of severe deterioration and obsolscence. Failures are frequent and repair costs and downtime often cost more than new equipment. Due to significant reductions in past years' capital equipment budgets, a large backlog of equipment requirements exists at all sites. The increase will cover the highest priority items within this backlog.

A large part of the increase is required for general support or "landlord" equipment at Hanford where the deterioration is most severe. The increase is part of the Congressionally mandated Facility Upgrading program which is planned to restore operational safety and reliability by the end of FY 1988.

Increased funding is also needed to support waste concentration efforts to conserve waste tank storage capacity and the restart of PUREX operations at Hanford and to replace or repair defective equipment needed for Idaho landlord activities. Specifically, the increase will provide:

- pilot plant equipment for waste concentration studies, and equipment to support evaporator operations;

- replacement equipment for cesium and strontium encapsulation and storage;

- equipment for transfer of high level waste from the PUREX Plant to new double shell waste tanks;

- upgrades of electrical and water distribution systems to support PUREX operation at Hanford; and

- the purchase rather than leasing of buses and the replacement of items in equipment pools at Idaho.

No items are expected to cost over $1.0 million.

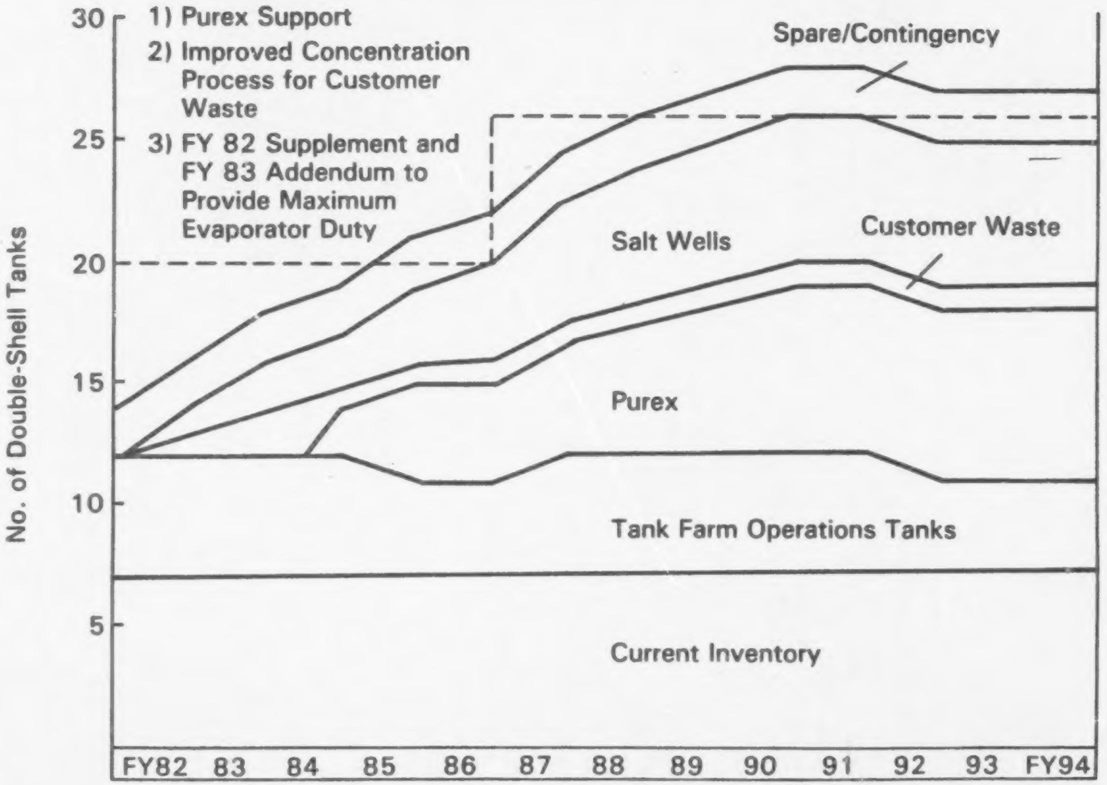
## Hanford Waste Tanks

Question: Why is it necessary to start construction of six new waste tanks at Hanford in 1983? Provide data to show this need and the impact of deferring this project to 1984.

Answer: Adequate storage capacity in double shell tanks is essential for liquid transferred from old single shell tanks and the high level liquid waste from PUREX operation which is scheduled to restart in FY 1984. Twenty-six of the 149 old single shell tanks have leaked and liquid is being removed from them to eliminate the possibility of further leakage. Requirements of DOD for plutonium make the restart of PUREX mandatory.

New double shell tanks must be available by the end of FY 1986. As shown in the attached chart, the amount of liquid that can be pumped from salt wells in the old tanks is constrained by the availability of double shell tanks. Delay of the project by one year would mean either an interruption of PUREX operation or the retention of more than three million gallons of pumpable liquid in leak-prone single shell tanks until new tanks are available. The transfer to double shell tanks would have to be stopped by FY 1984 to assure capacity for PUREX high level waste and could not be started again until 1987, resulting in continued use of single shell tanks for at least three additional years. This three for one impact results because pumping of interstitial liquids is not a linear function since about 80 percent of the liquids is removed the first year and the balance over the next three years, and the pumps cannot be stopped without damage once they have been started.

# WASTE VOLUME PROJECTIONS



## Defense Waste Processing Facility

Question: What is the status of the DWPF project at Savannah River? What remains to be done before proceeding to construction? How will the $30,000,000 requested for 1983 be used?

Answer: The conceptual design is complete and firm design is five percent complete. This represents a greater degree of design progress than is typical before construction start for complex chemical processing plants. Key process steps have been demonstrated with actual Savannah River Plant radioactive wastes. Key equipment has also been demonstrated at one-half scale or full scale with simulated waste.

The baseline cost estimate remains firm at $970 million (escalated dollars) including contingency. It is highly unlikely that the project cost will exceed the estimate, if funding is made available on a timely basis.

The final EIS has been issued and the Record of Decision (ROD) is expected by May 1982. Sufficient process and equipment development has been done to allow construction to start. Site preparation, characterization, and soil dewatering can begin upon publication of the ROD. Excavation and initial construction is scheduled for early FY 1984 consistent with the $30 million FY 1983 request.

The $30 million requested for 1983 would be used to continue design.

## Low Level Waste Volume Reduction

Question: What has been accomplished in the low level waste volume reduction efforts at various sites? What have we spent and what is being gained?

Answer: It is DOE policy to encourage reductions in the volume of low level waste requiring disposal at all facilities. This is a three phase program involving: (1) the institution of administrative controls to reduce the volume of waste generated, (2) the implementation of cost-effective techniques to process waste prior to disposal, and (3) technology development for improved volume reduction techniques.

As examples of administrative control, procedures have been developed at the source of generation to encourage better waste segregation practices prior to waste packaging. Also, routine waste management assessments of these practices help to keep attention focused on the need for waste segregation. Furthermore, a system of charging generators the incremental cost of disposing of the waste is being implemented. This not only encourages waste volume reduction, but also recovers some waste operations costs from DOE generators.

Cost-effective techniques for processing low level waste prior to disposal include compaction of waste types such as trash, clothing, paper, filters, etc.; shredding, torch cutting and mechanical disassembly of larger objects; and evaporation and solidification of liquid wastes. Liquid waste volume reduction has the added benefit of reducing requirements for new facilities to store the waste.

Other techniques are under study or development. These include the use of metal smelters, which can convert metal waste to its maximum density (and hence minimum volume), microwave plasma torches for incineration of organic liquid waste, advanced filtration methods to treat liquid effluent waste streams, and glass furnaces to convert resins, liquids, sludges, and filters into an immobilized form. In addition, a waste generation reduction manual was issued in early 1982. This manual describes methods to reduce waste volume at generator sites.

The program has been successful in reducing the volume of low level waste requiring disposal, thereby extending DOE burial ground lifetimes, and reducing requirements for the costly development of new burial grounds, and the construction of new facilities for liquid waste storage.

It is difficult to estimate what amounts have been spent on the operational aspects of waste volume reduction efforts since these efforts are part of larger activities at each DOE generator's site. However, in FY 1982, approximately $2.2 million will be spent for low level waste treatment technology development and studies. In FY 1983, the funding will be reduced to about $1 million with the completion of some of the development efforts.

## Byproducts Utilization Program

Question: What progress has been made in the beneficial uses program? Explain briefly and expand for the record.

Answer: Under the Byproducts Utilization Program, progress continues to be made in the use of cesium-137 for sewage sludge disinfection and food processing, the development of krypton-85 and tritium for airfield lighting, and the recovery and use of strontium-90 and platinum family metals.

The Department, with the support of Sandia Laboratories, assisted the City of Albuquerque and the Environmental Protection Agency (EPA), in formulating the Environmental Impact Statement for sewage sludge irradiation. The Citizens Advisory Committee to EPA has reviewed alternative methods of sewage sludge disinfection and has recommended that EPA choose irradiation as the best option. EPA has released a draft final EIS which approves irradiation as "innovative technology." Recent engineering design improvements to the pilot sludge facility at Sandia Laboratories will be incorporated in the planned Albuquerque demonstration facility.

In a cooperative effort with the U.S. Department of Agriculture, the States of California and Florida, the Citrus Growers Association of Florida, and the Food Growers Association of California, the Department is testing low dose (less than 100 kilorad) irradiation as a substitute for ethylene dibromide in combating fruit infestation by the Mediterranean fruit fly. Tests involving Florida citrus fruit will be completed before the end of FY 1982.

The brightness of krypton-85 and tritium airfield lighting has been increased under a joint effort by the Departments of Energy and Defense. Prototype lights were deployed and evaluated at both

Marine Bogue Air Field, North Carolina, and at Andrews Air Force Base. Demonstrations of the lights are scheduled on May 11, 1982, for the Rapid Deployment Forces at Ft. Bragg, North Carolina, and May 13, 1982, at the Navy's facilities at New London, Connecticut, for survival testing in a submerged helicopter.

The Department of Energy is continuing to evaluate the benefits of recovering materials from the fuel cycle, including precious metals and scrap metals generated at defense laboratories, and to plan for their separation from waste streams.

### Status of Waste Isolation Pilot Plant Project

Question: What is the status of the WIPP project? Describe your efforts to reduce the cost.

Answer: The WIPP project is proceeding on schedule. The exploratory program (Site and Preliminary Design Validation — SPDV) began on April 20, 1981. A 12 foot diameter exploratory shaft is complete to a depth of 2,300 feet and a 6 foot diameter shaft is complete to 2,200 feet. A 10 foot diameter steel liner has been installed in the larger shaft for the first 850 feet. A hoist and headframe are also complete and underground work has started.

Title II design started in February 1981, and is proceeding at low level of effort due to funding constraints. A rapid buildup is planned for FY 1983. Sandia is providing geotechnical, site characterization, and experimental support.

In December 1981, the Department of Energy approved the cost, schedule, and technical baseline for the Waste Isolation Pilot Plant (WIPP) project. The baseline cost was $948.7 million with construction completion in June 1988. This cost included capital and operating funds through completion of construction. In approving the WIPP baseline, the Under Secretary directed the project participants to reduce the cost of the project while maintaining safety and the approved objectives.

All aspects of the project design, construction, operation, and experimentation were considered. The primary guidance was to meet the mission stated in P.L. 96-164. Of equal importance was to ensure that safety, environmental, State of New Mexico, and other concerns were considered. To date, changes have been proposed which will save $200 million beginning in FY 1984 through construction completion and reduce the future operating costs for the facility by about 25 percent. Construction will be completed six months sooner, in December 1987. The proposed facility changes include:

- deleting one shaft;
- reducing the size and number of surface buildings;
- reducing road construction; and
- value engineering of control, temporary power, ventilation, and filtration systems.

In addition to savings in actual facility costs, other major programmatic changes have been proposed:

- management of construction by the Corps of Engineers;
- allowing resource recovery in Zone-4 of the site; and
- reducing technical support and experimentation activities.

The Department is proceeding with Title I (preliminary) design for these changes and with a determination of what environmental documentation may be necessary. This design work will enable us to develop more definite estimates for an updated baseline.

## State of New Mexico Participation

Question: How much money is being provided to the State of New Mexico for their participation in the projects?

Answer: The State of New Mexico independently reviews the environmental, health, and safety aspects of the WIPP project. The annual DOE budget for the State activities is about $800,000.

## Brine Pocket at WIPP Site

Question: There were newspaper reports that water was encountered in the WIPP site characterization program. What was found and what is the significance of this?

Answer: A pressurized brine pocket was encountered at the WIPP site, near Carlsbad, New Mexico, on November 22, 1981, at a depth of 3,012 feet while deepening an exploratory hole (WIPP-12) about one mile north of the site center. This depth is about 900 feet below the proposed storage level for WIPP and 500-600 feet from the proposed northernmost lateral extent of the underground facility.

WIPP-12 was later drilled to a depth of 3,900 feet and core samples taken. The well is now capped and the pressure buildup is being monitored. Future plans call for a flow test and taking samples for age dating to further characterize the brine pocket. These tests are scheduled for May 1982. The test program and its results are subject to review by the State of New Mexico.

The brine was encountered in a geologic formation where previous brine occurrences had been found. The test hole is located on a known anticline, a subsurface feature which can be deformed and fractured. The resulting porosity allows brine to accumulate. A similar brine pocket, encountered in an earlier test hole, was shown to have been isolated, in place, in excess of 800,000 years.

DOE's experience with brine in the Carlsbad area leads to the expectation that it is not a threat to the integrity of WIPP because brine is typically isolated, at least many hundreds of thousands of years old, and there is no evidence of recharge by fresh water. Another important consideration is the large vertical separation (about 900 feet) between the waste disposal horizon and the level of the brine encounter.

In its Final Environmental Impact Statement (FEIS) for WIPP, DOE explored some of the effects that would follow penetration of an unexpected brine pocket under the facility. A hypothetical brine pocket 200 feet beneath WIPP was assumed to be connected, through the storage area, to the aquifer above the facility. Even with extremely conservative assumptions, the analysis calculated radiation doses which were small fractions of natural background. In light of the recent brine discovery, we are developing a more specific consequence analysis with the actual data from WIPP-12. The analysis will provide the basis for determining the acceptability of any nearby brine reservoirs and evaluate the minimum separation to preclude a natural breach of the waste storage facility. This work will be completed this summer.

Funding for Waste Isolation Pilot Plant

Question: Provide a breakdown as to how the $14,000,000 in operating expenses and $110,800,000 in construction will be used. Provide a listing of the contracts to be awarded and the schedule for these awards.

Answer:

| Use of Operating Funds | $ Millions |
|---|---|
| Site and Geotechnical (Sandia) | $ 2.9 |
| In-Situ Experimental Program (Sandia) | 7.8 |
| Experimental Program Operations (Westinghouse) | 1.2 |
| USGS | .2 |
| State of New Mexico | .8 |
| Other Operating Costs | 1.1 |
| | $14.0 |

| Use of Construction Funds (Contract Award Date | $ Millions |
|---|---|
| Existing Mining Contract Awarded | $ 6.5 |
| Water Tanks and Pipeline (2/83) | 12.1 |
| Experimental Area Mining (4/83) | 11.9 |
| Site Development, Warehouse, Shops (4/83) | 7.7 |
| Shafts (6/83) | 21.3 |
| Construction Management — Corps of Engineers (Negotiated) | 1.5 |
| Lease Acquisition (Currently in Court) | 10.0 |
| Other Work Under Contract | 5.6 |
| Technical Support — Westinghouse (Awarded) | 11.1 |
| A/E Design — Bechtel (Awarded) | 23.1 |
| | $110.8 |

## QUESTIONS SUBMITTED BY SENATOR SCHMITT

### Additional Questions on the Waste Isolation Pilot Plant

Question: Does the Department intend to deposit high level nuclear waste at the WIPP site? Can you clarify the Department's plans for upgrading the highways serving the WIPP site? How much money will be saved by the new WIPP construction plans? What environmental reports under NEPA or other applicable laws will be required? Does the Department have plans to use local labor and contractors on the WIPP site?

Answer: The purpose of the WIPP is explicitly defined in Public Law 96-164 as a research and development facility to demonstrate the safe disposal of defense nuclear waste. As described in our January 22, 1981, Record of Decision, WIPP will include an experimental facility for conducting experiments on small volumes of defense high level waste. The Final Environmental Impact Statement describes our plans to emplace 40 canisters of this waste. The high level waste used for experiments will be retrieved and removed from the site prior to decommissioning of the WIPP facility.

As part of the court's stipulated agreement staying the New Mexico Attorney General's lawsuit, a joint state-federal task force has been established to seek to resolve the state's "off-site" concerns. The safety of New Mexico highways for transporting waste to WIPP is one of these concerns. As last reported to the court on February 5, 1982, the state has requested that DOE provide $69 million to upgrade New Mexico highways projected for use in transporting these wastes. DOE is evaluating the request on its technical merits and is scheduled to respond to the state by the end of May.

The recently completed cost reduction analysis has identified potential savings of $200 million. These savings can be achieved beginning in FY 1984 and reduce the construction period by six months.

The Department is currently evaluating what environmental reports, if any, will be required. This determination will be made in the near future.

The Department is actively seeking to use local labor and contractors to the maximum extent possible.

### Minimizing Site Demonstrations at the Waste Isolation Pilot Plant

Question: What plans to avoid or minimize future WIPP site demonstrations have been formulated by the DOE?

Answer: The Department's Albuquerque Operations Office has prepared a plan detailing the response to demonstrations at the WIPP site. This plan is intended to minimize the impact of demonstrations and improve communications with local authorities and the media. The media throughout the state have been advised of the key elements of this plan. In addition, response guidelines have been issued to DOE and contractor employees at the site. These guidelines cover their interaction with the local authorities and emphasize that the local law enforcement officials are in charge.

### Spent Fuel Processing and Laser Isotope Separation

Question: Could you clarify the DOE's plans for the reprocessing of nuclear waste? Could you detail the progress you have made towards implementing the FY 1982 energy and water appropriations bill that requires you to focus on application of fuel cycle laser concepts?

Answer: We understand your use of the term "nuclear waste" to be equivalent to our term "spent fuels" from nonproduction reactors. We are requesting $18,000,000 in FY 1983 for further evaluation and study of the best alternative for providing the capability for processing DOE-owned nonproduction fuels. On the basis of preliminary studies not yet complete, we anticipate modifying existing processing facilities at either Richland, Washington, or Savannah River, South Carolina. If project design begins in FY 1984, project construction could be finished in FY 1989. The modified facility would be equipped with capability for processing DOE-owned Clinch River Breeder Reactor and Fast Flux Test Facility fuel. The same capability might be useful in processing of limited quantities of commercial spent reactor fuel to obtain plutonium for the DOE breeder reactor program, but no decision has been made on this matter.

The Department is conducting research and development on plutonium Laser Isotope Separation technology, with studies being conducted at Lawrence Livermore National Laboratory and Los Alamos National Laboratory.

*DELETED*

If the plutonium LIS technology is successful, the Department proposes to clean up DOE-owned fuel-grade plutonium, after chemical separation, to weapon-grade purity or better and to further purify the plutonium already in the existing weapons stockpile.

The DOE has no plans to utilize spent nuclear fuel from civilian power reactors as a source of plutonium for nuclear weapons. Nor are proposals to take such a step under active consideration. On the contrary, given the importance of maintaining a clear distinction between the peaceful and the military uses of nuclear energy as well as the domestic and nonproliferation implications of such a step, we would consider such an action only if absolutely essential for U.S. national security.

Moreover, such an action would have to be approved at the highest levels of Government, and the views of Congress would be sought and carefully weighed in the decisionmaking process.

## Inertial Fusion

Question: In the ICF program, you are attempting to simulate weapons effects in the laboratory by igniting a small thermonuclear plasma. This is very important to the weapons program. What are the major facilities being designed for this purpose and what is the status of those facilities? Is there enough funding in FY 1983 to keep them on schedule? Why are all the FY 1983 add-on for construction funds for ICF going to the NOVA program when the funds for the PBFA-II facility are being stretched out? What is the breakdown on the ICF operating category?

Answer:

*DELETED*

The status of each of the facilities is as follows:

The FY 1983 add-on construction of $17 million will permit the continuation of a 10-beam NOVA facility with frequency conversion to be completed by the second quarter of FY 1985. This completion date is contingent upon an appropriation of $26.5 million in FY 1984, with a total estimated cost (TEC) of $185 million.

We have carefully reviewed the various options for NOVA and determined that the program should proceed with construction of a 10-beam NOVA capable of focusing about 100,000 joules of energy (red) on target. Furthermore, this facility includes laser color conversion for the second and third harmonics. The inertial fusion community has agreed that this is the technically correct choice for the program, and all of the program participants are in support of this recommendation.

The ANTARES project is authorized at a TEC of $62.5 million, and all necessary funds to complete the project have been appropriated. The project is scheduled to be completed in the fourth quarter of FY 1983 and is proceeding on schedule within the estimated cost.

Funds for PBFA-II are being stretched out as part of a programmatic decision involving several factors: (1) the need to complete a major new design for PBFA-II based on use of higher voltage, (2) the need for a separate facility to avoid shutdown of PBFA-I, and (3) the need for extensive experimental campaigns on PBFA-I to address critical diode focusing and foil implosion technical issues. With the funding requested for FY 1983, PBFA-II will be completed in the fourth quarter of FY 1985 with a TEC of $40.7 million.

The breakdown on operating funding in the ICF category for FY 1983 is as follows:

| | |
|---|---|
| Glass Laser Experiments | $ 66.5M |
| Gas Laser Experiments | 37.0M |
| Pulse Power | 16.5M |
| Support | 2.0M |
| Total Operating | $122.0M |

Question: I understand that during the last year the Los Alamos program has obtained a great deal of new information from a very active experimental program. Could you tell us some of the highlights of this work and how they impact the prospect for inertial fusion applications?

Answer: The Los Alamos National Laboratory (LANL) Carbon Dioxide $CO_2$ Inertial Fusion Program has made significant progress during the last year.

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LANL has concentrated recent efforts on developing a new laser-target interaction model and novel target designs *DELETED* Several concepts have been evaluated with the HELIOS laser, and the more promising will be extended to ANTARES.

*DELETED*

(Question and answer deleted.)

Question: In the past, we have heard discussions of both civilian and military applications of inertial fusion. Recently the military benefits have been receiving most of the attention. Does this mean you have abandoned civilian applications?

Answer: No.

*DELETED*

M-X Missile

Question: In your budget request is item 81-D-115, identified as MX warhead production facilities. The request for FY 1983 is $35,000,000. Could you explain what these facilities are for and where they are located?

Answer:

*DELETED*

The new facilities to be built under Project 81-D-115 consist of increased production capacity and new capabilities needed to produce and assemble weapon parts and assemblies required to produce the ABRV warhead for the M-X system.

*DELETED*

These new facilities will be located at: the Bendix Plant, Kansas City, Missouri; the Pinellas Plant, St. Petersburg, Flordia; the Pantex Plant, Amarillo, Texas; the Mound Facility, Miamisburg, Ohio; the Rocky Flats Plant, Golden, Colorado; and the Y-12 Plant, Oak Ridge, Tennessee.

Question: Are these facilities dependent on the particular warhead selected for the M-X missile? If so, then which warhead are you planning for?

Answer: Yes.

*DELETED*

(Question and answer deleted.)

Question: What is the difference in facilitization costs between the two warheads?

Answer: The total estimated cost of facilities for production of the ABRV warhead is $125 million. We have no comparable cost estimate for production facilities for the MK-12A warhead.

*DELETED*

It is clear, however, that a change in the M-X warhead design at this time will increase the total estimated cost for Project 81-D-115.

Question: If the Mark-12A is chosen as the warhead for the M-X would the projected costs under this line item change?

Answer: Yes. In order to meet the very tight production schedule for the M-X warhead, we have begun construction of the most critical facility elements for the ABRV design. These elements will be used in future years to support production of other nuclear warheads,

*DELETED*

Question: Since the Mark-12A is currently in production, would there be a reduction in costs should the warhead be chosen?

**Answer:** *DELETED* The production facilities that will be released on completion of MK-12A/W78 production have been committed to other weapon systems scheduled to go into production before 1986. This is standard procedure in planning weapons production activities to keep down facility costs for new warhead production systems.

*DELETED* No reduction in costs should be expected.

**Question:** Could you provide a breakdown of the various costs, including facilitization, materials, development, etc., for both the ABRV and the Mark-12A?

**Answer:** A current detailed breakdown for the ABRV and the Mark-12A is not available.

*DELETED*

**Question:** Does the Department intend to address the critical problem of the deterioration of this country's energy and defense capital base? Two examples of this glaring problem are the Detonator Facility and the Tritium Handling Facility at Los Alamos. What is the status of these facilities? Can we expect the Department to adequately support these projects funded last year?

**Answer:** The Department has long recognized the deficiencies that now exist in the capital base of the nuclear weapons complex. The first step in solving these deficiencies is the utilities and equipment restoration program which was initiated in FY 1980 and will continue for several more years. Additionally, we are in the process of identifying all known facilities necessary to revitalize the nuclear weapons research, development, and testing complex. We are anticipating that in FY 1984 the DOE will request the first increment of funding necessary to revitalize the complex.

In regard to the Detonator Facility and the Tritium Handling Facility at Los Alamos, we are now in the process of securing construction bids within the funds available. The DOE fully supports the need for these facilities.

**Question:** It is crucial that components be hardened against radiation and tested to assure they function during and after being exposed. This is one purpose of underground tests. Can't this be done more inexpensively in the laboratory in facilities such as the Simulation Laboratory at Sandia? What is the status of that facility?

Answer: Testing of some weapon system components for radiation hardness is accomplished both in the laboratory (using facilities such as HERMES II, HYDRA, REHYD, and the Sandia Pulse Reactor III) and in underground nuclear tests. Laboratory testing has the obvious advantage of being much lower in cost; however, with present simulation equipment, threat-representative flux levels cannot be achieved over large enough spacial areas. For measurements requiring large exposure areas, underground testing is the only alternative.

Completion of the Sandia Simulation Technology Laboratory (STL) will dramatically increase laboratory simulation capabilities and reduce dependence on underground simulation testing. Funding for STL design was included in the FY 1982 appropriation bill and selection of a design contractor is underway; but, because of fiscal constraints, construction funds for this project were not included in the FY 1983 budget request.

Question: Why did the DOE barricade an airplane hangar space without notice to the lessee at the Los Alamos airport? The cost of this barricade has been estimated at $1,000—is this an accurate figure? What alternatives to this action were considered? What is the status of the review of the airport plan submitted by the private owners?

Answer: The Department of Energy (DOE) maintains a priority list of individuals who can lease hangar spaces at the Los Alamos airport. Due to the limited space available at the airport, not all users are able to park their planes in hangars or at tie-down spaces. With regard to the barricaded hangar, the individual who leased the hangar lost his pilot's license due to a heart condition. The DOE office was contacted and a list of eight eligible prospects was provided to the lessee. No one was interested in leasing the hangar. The DOE decided to leave it vacant until the proposed airport modifications were agreed upon. One of the local pilots then parked his plane in the unused hangar without permission. The DOE office contacted the user in writing concerning this situation, but that letter was not acknowledged although it was received. While the user was flying his plane in March, the hangar was barricaded. The cost to build the barricade was $239.22. It was also necessary to repair the barricade after someone tried to remove it for an additional cost of $107.18.

In regard to the plans recommended by the airport users for modifications to the Los Alamos airport, the plans have been reviewed by the Albuquerque Operations Office (AL) and the Federal Aviation Administration (FAA). The FAA has indicated that they have proposed modifications that they wish to discuss with all parties. AL has been in contact with Senator Schmitt's Santa Fe office to arrange a meeting to review the FAA's recommended modifications with the airport users.

## SUBCOMMITTEE RECESS

Senator McClure. The committee will be in recess until tomorrow afternoon.

[Whereupon, at 3:30 p.m. Wednesday, April 21, the subcommittee was recessed, to reconvene at 2 p.m. Thursday, April 22.]

# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 1983

THURSDAY, APRIL 22, 1982

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
*Washington, D.C.*

The subcommittee met at 2:12 p.m. in room 1223, Everett McKinley Dirksen Senate Office Building, Hon. J. Bennett Johnston presiding.

Present: Senators Abdnor and Johnston; also present: Senator D'Amato.

## DEPARTMENT OF ENERGY

### HIGH-ENERGY PHYSICS, BASIC RESEARCH, ENVIRONMENTAL RESEARCH, AND MAGNETIC FUSION PROGRAMS

### STATEMENT OF DR. ALVIN W. TRIVELPIECE, DIRECTOR, OFFICE OF ENERGY RESEARCH

ACCOMPANIED BY:

- JAMES S. KANE, DEPUTY DIRECTOR, OFFICE OF ENERGY RESEARCH
- DELMAR D. MAYHEW, ACTING DIRECTOR, FINANCIAL MANAGEMENT DIVISION, OFFICE OF ENERGY RESEARCH
- JOHN CLARKE, ASSOCIATE DIRECTOR, OFFICE OF MAGNETIC FUSION ENERGY
- TONI JOSEPH, ASSOCIATE DIRECTOR, OFFICE OF FIELD OPERATIONS MANAGEMENT
- DR. RICHARD PRESCOTT KROPSCHOT, ASSOCIATE DIRECTOR, OFFICE OF BASIC ENERGY SCIENCES
- DR. CHARLES W. EDINGTON, ASSOCIATE DIRECTOR, OFFICE OF HEALTH AND ENVIRONMENTAL RESEARCH
- DR. JAMES LEISS, ASSOCIATE DIRECTOR, OFFICE OF HIGH ENERGY AND NUCLEAR PHYSICS

### INTRODUCTORY REMARKS

Senator JOHNSTON. The hearing will come to order.

This afternoon we continue our hearings on the fiscal year 1983 budget request of the Department of Energy. Today, we will hear testimony on the fundamental research programs of the Office of Energy Research, magnetic fusion, and other basic research activities. Following that, we will then turn to the Department's environmental protection, safety, and emergency preparedness programs.

First, I would like to welcome Dr. Al Trivelpiece who is Director of the Office of Energy Research.

Doctor, you have a special welcome since this is your first appearance before the committee. Your statement of 43 pages is by far one of the largest we have had this year. You may summarize it as you wish and tell us the important things about your budget.

### INTRODUCTION OF ASSOCIATES

Dr. TRIVELPIECE. Thank you, Mr. Chairman.

If I may, I would like to introduce some of the people I have brought here with me responsible for some of the elements. Jim Kane, my deputy; Mr. Delmar Mayhew, Budget Officer; behind is John Clarke, Associate Director for the Fusion Program; Toni Joseph, Associate Director for Field Operations Management; Dr. Edington, who is head of the Office of Health and Environmental Research which includes the life sciences and nuclear medicine program; Dr. Richard Kropschot, head of Basic Energy Sciences; and Dr. Leiss, who is head of the high-energy and nuclear physics program.

### PREPARED STATEMENT

With your permission, I would like the prepared statement included in the record and then I would like to proceed with a brief overview and answer what questions you may have.

Senator JOHNSTON. Please do.

[The statement follows:]

## STATEMENT OF ALVIN W. TRIVELPIECE, DIRECTOR, OFFICE OF ENERGY RESEARCH, DEPARTMENT OF ENERGY

I am pleased to appear before you today to discuss the FY 1983 budget request for the research programs supported by the Office of Energy Research. The programs included under the General Sciences and Research appropriation are High Energy Physics, Nuclear Physics and Life Sciences and Nuclear Medicine Applications. Included in the Energy Supply R&D appropriation are Basic Energy Sciences, Biological and Environmental Research, Magnetic Fusion Energy, Energy Research Analyses, University Research Support, and Multiprogram General Purpose Facilities.

The research programs supported by the Office of Energy Research are important investments in our Nation's future. I believe that a vigorous program of scientific research contributes to national security, economic growth and, in no small sense, to human culture and understanding. Our ability to solve our economic and technological problems in this decade and beyond will depend on the scope and depth of our scientific knowledge and on the progress that results from continued support for basic research programs.

Let me turn now to the budget request for our programs. The total FY 1983 budget request for the programs supported by the Office of Energy Research is $1.5 billion. Of that amount, $601 million falls under the General Sciences appropriation, with $902.1 million under the Energy Supply R&D appropriation. Table 1 summarizes the Energy Research request. Under General

## Table I

### Office of Energy Research
Summary by Program
($ in millions)

| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| General Sciences | | |
| High Energy Physics | $361.5 | $429.0 |
| Nuclear Physics | 133.9 | 131.0[a] |
| Life Sciences Research & Nuclear Medicine Applications | 47.4 | 39.0 |
| General Sciences Program Direction | 4.9 | 2.0 |
| Unobligated Balances/FY 1980 and FY 1981 Deferrals | -5.0 | 0 |
| Subtotal | $542.7 | $601.0 |
| Energy Supply - R&D | | |
| Basic Energy Sciences | $241.3 | $282.9[b] |
| Biological and Environmental Research | 165.0 | 129.8 |
| Magnetic Fusion | 453.8 | 444.1 |
| Energy Research Analyses | 5.0 | 2.6 |
| University Research Support | 10.6 | 5.1 |
| Multiprogram General Purpose Facilities | 32.6 | 34.0 |
| Advisory and Oversight Program Direction | 3.3 | 3.2 |
| Policy and Management | 1.0 | 0.4 |
| Subtotal | $912.6 | $902.1 |
| Total | $1455.3 | $1503.1 |

a/ Reflects transfer of National Superconducting Cyclotron project to National Science Foundation (NSF); prior to transfer, $6.8 million was planned for the project in FY 1983.

b/ Reflects transfer from NSF of Stanford Synchrotron Radiation Laboratory, resulting in increase of $6.8 million in FY 1983 request.

Sciences, the FY 1983 budget request for High Energy Physics is $429.0 million; for Nuclear Physics the request is $131.0 million. Our request for Life Sciences Research and Nuclear

Medicine Applications is $39.0 million. Finally, we are requesting $2.0 million for General Sciences Program Direction. Under Energy Supply R&D, our FY 1983 budget request includes $282.9 million for Basic Energy Sciences, $129.8 million for Biological and Environmental Research, $444.1 million for Magnetic Fusion Energy, $2.6 million for Energy Research Analyses, $5.1 million for University Research Support and $34.0 million for Multiprogram General Purpose Facilities. Our request also includes $3.2 million for Advisory and Oversight Program Direction and $0.4 million for Policy and Management.

I would like to discuss each of these programs briefly, beginning with those under the General Sciences appropriation, and then I would be pleased to respond to questions.

## HIGH ENERGY AND NUCLEAR PHYSICS

The High Energy and Nuclear Physics (HENP) programs are following lines of inquiry that have occupied man's mind throughout history. As a result of continuing research in high energy and nuclear physics, we now know more than ever before about the universe in which we live, the fundamental constituents of matter and the laws of nature that underlie all physical processes. Energy Research programs fund approximately 90% of the nation's research in high energy and nuclear physics, with the remainder supported by the National Science Foundation.

These programs have been extremely successful over the last 2-3 decades. HENP-supported researchers have won five Nobel prizes in the last seven years and fifteen in the last 25 years.

During budget hearings every year, there is considerable discussion about the large laboratory and university facilities--accelerators, colliding beam facilities, detectors--that are required to carry out research in high energy and nuclear physics. Today, I would like to focus for a moment on another key term in the High Energy and Nuclear Physics dictionary. That term is "user group." Generally the experimental research in High Energy and Nuclear Physics is done by university-based scientists who frequently collaborate, or form user groups, with scientists from other universities or DOE's national laboratories.

The term user group, while descriptively accurate, does not adequately convey the importance of the concept either in terms of research or the training of tomorrow's scientists. Let me take a moment to elaborate on that concept. The size and complexity of a typical High Energy Physics research experiment makes it especially appropriate for users from a number of institutions to collaborate. These research teams design an experiment at their home institutions, then submit a proposal to a scientific program advisory committee made up of representatives from the labs and university community who evaluate the proposal and assess its relative priority for scarce accelerator time. If approved by the committee and the management of the appropriate lab, the research team fabricates, installs and tests the apparatus at the lab. Laboratory staff, in addition to constructing, operating and carrying out research on the accelerators, also provide significant assistance to the user group at this stage of the process. Experiments are carried out with laboratory assistance, and the recorded data is taken back to the home institutions for analysis and publication. The entire process from conception to publication generally takes from three to five years. Some experiments are also conducted by accelerator laboratory scientists who must compete for accelerator time in the same way as the user groups do.

The High Energy Physics program, focused at three major accelerator laboratories, supports over 100 user groups. The Nuclear Physics program, carried out at eight national facilities, accommodates approximately 70 user groups of university researchers.

Through research and planning activities participants from a total of about 100 universities all across the country contribute to the success of the HENP programs. These user groups and the staffs of the laboratories represent the all important human side of these high technology programs.

## HIGH ENERGY PHYSICS

Let me turn now to the FY 1983 budget request for the High Energy Physics Program. The FY 1983 budget request for High Energy Physics is $429 million in budget authority. Of that amount, $331 million is for operating expenses; $47.5 million is for capital equipment and $50.5 million is for construction (Table 2). These funds will enable us to continue to seek a better understanding of the basic constituents of matter and the fundamental forces of nature that comprise and control the world around us.

Table 2

High Energy Physics
Budget Authority
($ in Millions)

| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| Operating Expenses | $ 269.2 | $ 331.0 |
| Capital Equipment | 40.7 | 47.5 |
| Construction | 54.6 | 50.5 |
| Total High Energy Physics | $ 364.5 | $ 429.0 |

In this century, scientific investigation has focused on ever more fundamental constituents of matter, and on more elemental concepts. The research frontier first moved from molecules to atoms to nuclei to the constituents of nuclei (protons and neutrons). Recently it has moved to even more elemental subnuclear constituents, such as "quarks", "leptons" and "bosons".

To probe into the depths of matter, into the domain of quarks, scientists use intense beams of very energetic particles which can be produced only by high energy particle accelerators. Progress in High Energy Physics is dependent on the availability of these forefront accelerator and colliding beam facilities and complex detectors that map the effects of particle collisions. The smaller the particle to be studied and the higher the energies holding its component parts together, the larger and more powerful must be the accelerators, detectors and other equipment required to do the research.

This technology, however, is only one part of the program. Progress in High Energy Physics research is based on a continuing interplay of advancements in experiment, theory and technology. High Energy Physics experiments are done at the forefront of theoretical and technical knowledge; and the range of experiments possible is determined by the available technology. Physicists frequently have to invent unique equipment to carry out the experiments of greatest importance. It is in this way that High Energy Physics contributes directly and immediately to the technological base of the country.

This technological advancement, while not the goal of the research, is a virtually guaranteed bonus which cannot be predicted in advance. There have been many spin-offs from High Energy Physics research, including the technology of superconducting materials and devices, radio frequency power generation, materials analysis and medical applications, including new methods of treating cancer. More recently, the use of synchrotron light from particle accelerators opened up totally new research capabilities in chemistry, solid state physics, biology and industrial applications. Free-electron lasers, driven by particle accelerators, promise new capabilities for enhanced laser power and control. Radiation processing, which was born from this science, has many exciting new applications ranging from the manufacture of heat-shrinkable electrical insulation to the sterilization of wastes and the preservation of food.

Because of the length of time required to obtain research results and to assess the true significance of these results vis a vis other research results, the specific end product of the research--the new knowledge--cannot readily be planned for or predicted in advance. Despite this, the history of progress and achievement in this field enables us to say confidently that we are moving rather rapidly toward our goal of better understanding the physical world around us.

For example, we have an increasingly better understanding of the so-called basic forces in nature. It appears now that the previously assumed four forces of nature--electromagnetic, weak nuclear and strong nuclear forces, and gravity--may indeed be different forms of a single unified force. Research results have indicated that the weak nuclear and electromagnetic forces are actually a single force--the electroweak force. The 1979 Nobel Prize went to two U. S. physicists for work toward this unification. The 1980 Nobel Prize in Physics also was given to two U. S. physicists for work that, ultimately, may unify the strong nuclear and electroweak forces into a "grand unified force," as it is referred to. This would reduce the number of forces to only two. Current thinking is that the gravitational force will be incorporated into a unification scheme, thus bringing all of the basic forces into a single unified framework, a life-long goal of Albert Einstein. We cannot predict what will follow from research aimed at verifying this unification theory. However, we can anticipate profound, world-changing effects analogous to those that followed the unification of electricity and magnetism by Maxwell in the late

19th century and the unification of matter and energy by Einstein early in this century.

The FY 1983 budget request of $429 million for High Energy Physics compares to $364.5 million in FY 1982. This increase of $64.5 million would permit us to pursue these important lines of investigation with a significantly higher level of utilization of existing facilities. It also would provide for continued progress on the Fermilab development program as well as long-range accelerator R&D. More specifically, it would allow us to increase facility utilization at Fermilab, the Stanford Linear Accelerator Center (SLAC) and at the Brookhaven National Lab (BNL). It would also allow us to provide additional support for university and laboratory groups at levels matched to the higher utilization level of facilities and the greater complexity of experiments.

The high energy particle accelerator and colliding beam facilities that would be operated under the requested FY 1983 budget include the 30 billion electron volt (GeV) proton Alternating Gradient Synchrotron at Brookhaven, the 500-1000 GeV proton synchrotron at Fermilab and the 32 GeV linear electron accelerator at SLAC. SLAC also has two electron-positron colliding beam facilities for which the linear accelerator acts as the injector. These facilities are called SPEAR and the Positron-Electron Project (PEP). Each of the three national accelerator centers provides a unique set of capabilities which complement the others. Together, they represent the facilities essential for a comprehensive national research program in High Energy Physics.

The FY 1983 budget request for operating expenses of $331 million is necessary to increase the low facility utilization levels experienced in recent years as a result of fiscal restraints, rapidly increasing power costs and the construction of new or upgraded accelerators. The FY 1983 request would allow us to increase utilization levels that are currently below 50% to the 60-70% range. Another major feature of the operating program in FY 1983 is the shakedown, initial operation and achievement of the first circulating beam in the Energy Saver modification at Fermilab. Energy-Saver is the first step of an ongoing development program aimed at increasing the power of the proton synchrotron at Fermilab while, at the same time, reducing the cost of electricity required to run accelerators. The Energy-Saver, which consists of a ring of superconducting magnets installed inside the main ring tunnel, will extend operation of the accelerator to 500 GeV or higher for fixed target experiments. It is these superconducting magnets that operate at temperatures of nearly absolute zero that allow major savings in electric power costs.

The operating expenses request also will give priority to operations at PEP, the electron-positron colliding beam facility at SLAC. PEP began operation in late 1980. In FY 1983, the full initial complement of detectors, including the High Resolution Spectrometer and the Time Projection Chamber, will be in operation.

The construction request of $50.5 million includes $36 million for continuation of the Fermilab development program, $18 million each for Tevatron I and II. Tevatron I, will permit acceleration up to 1000 GeV and provide a facility for proton-antiproton collisions at 1000 GeV. Tevatron II will further expand the accelerator's capabilities by providing upgrading of the experimental areas and beam lines tangential to the main ring for fixed target experiments. The remainder of the construction request is for Accelerator Improvement Projects essential to maintain the reliability, efficiency and scientific effectiveness of the existing accelerator facilities and for

General Plant Projects essential to the efficient and reliable operation of the laboratory sites.

Budgets for High Energy Physics have fallen short of long-term planning levels in recent years and especially in FY 1982. These shortfalls have been absorbed primarily by substantial reductions in the level of facility operations and by cutbacks in the rate of construction of facilities, especially on the ISABELLE project. No construction funding for the ISABELLE project is requested in FY 1983. Difficulties have been encountered in the development of suitable superconducting magnets for this project. While considerable and encouraging progress has been made during the last year, substantial effort is still needed to develop a prototype capable of being produced at acceptable costs in the number required. The R&D efforts supported at Brookhaven allow for development of suitable magnets and for the analysis of alternate accelerator options which, while retaining unique and exciting physics research potential, can be constructed within available budget resources.

Let me turn now to the Nuclear Physics program.

## NUCLEAR PHYSICS

The FY 1983 budget request for Nuclear Physics is $131 million, with $113.4 million of that for operating expenses, $9.9 million for capital equipment and $7.7 million for construction (Table 3). Through the Nuclear Physics program we continue to

Table 3

Nuclear Physics
Budget Authority
($ in Millions)

| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| Operating Expenses | $ 112.4 | $ 113.4 |
| Capital Equipment | 9.5 | 9.9 |
| Construction | 12.0 | 7.7 |
| Total Nuclear Physics | $ 133.9 | $ 131.0 |

seek a better understanding of atomic nuclei and nuclear matter at the most fundamental level possible. By using nuclei as a "proving ground" we also hope to learn more about the fundamental forces of nature--a goal Nuclear Physics holds in common with High Energy Physics.

If we were to achieve these goals completely, we would be able to quantitatively describe all of the diverse structures, properties and interactions of nuclei in terms of the fundamental forces and constituents of our universe. Although we may never completely realize these goals, their pursuit does lead us to a better understanding of nuclei and their role in the physical universe. In doing so, it gives us a national base of knowledge, techniques, instrumentation and skilled manpower in critical technologies.

The FY 1983 budget request would provide for a continuing program of closely related experimental and theoretical investigations of atomic nuclei. Basic nuclear physics research has a growing interaction with high energy particle physics and astrophysics. In FY 1983, these growing interface areas of nuclear physics will be emphasized. As our understanding of quarks grows it is becoming clear that quarks and their interactions must play an important role in the structure, internal dynamics and interactions of nuclei. However, the nature of this role is an open scientific issue. This issue would be explored through theoretical and experimental investigations in FY 1983, investigations that will include a look at the possibility of new and very different forms of nuclear matter.

Nuclear physics, high energy particle physics and astrophysics also share an interest in the weak interaction. One of the fundamental forces of nature, the weak interaction governs the beta decay of nuclei. In FY 1983, research at the Los Alamos Clinton P. Anderson Meson Physics Facility (LAMPF) and at MIT's William H. Bates Electron Linear Accelerator would focus on experiments which are intended to provide understanding aimed at the unification of the strong, weak and electromagnetic forces of nature. Work is also being done with neutrinos at Brookhaven. Because neutrinos are the only form of radiation that can escape the interior of the sun without many changes, they are our only direct source of information on the physical processes of the sun's interior. In addition to improving our understanding of the unified theories of the fundamental forces, increased knowledge about neutrinos could lead to a better understanding of the origins of our universe.

Also in FY 1983, the high quality beams and detector systems now available at the Holifield Heavy Ion Research Facility at the Oak Ridge National Laboratory will be used to study the mechanisms by which colliding nuclei exchange mass, energy and spin. Completed last year, the Holifield facility will conduct its first full year of research in FY 1982.

The FY 1983 budget request of $131.0 million for Nuclear Physics is a decrease of $2.9 million from the FY 1982 appropriation. That decrease results in part from the transfer of the National

Superconducting Cyclotron Laboratory construction project to the National Science Foundation. It was funded at $4.5 million for FY 1982.

As is the case in High Energy Physics, the capabilities of accelerator facilities determine which experiments can be conducted and which cannot. The LAMPF and Bates facilities and the Bevalac at the Lawrence Berkeley Laboratory are unique in the world and serve well their respective areas of basic nuclear research. Efficient operation of these facilities will be given high priority in FY 1983. Because of budgetary constraints, the number and mix of low energy and heavy ion facilities is undergoing reevaluation so that the new and unique capabilities of the Holifield Heavy Ion Research Facility and the Argonne Tandem/Linac Accelerator System (ATLAS), now under construction, can be fully utilized.

The FY 1983 construction request of $7.7 million for Nuclear Physics includes $3.7 million to complete construction of ATLAS. This new facility will provide heavy ion beams of exceptional quality in a previously unexplored energy range. To accommodate this evolution and assure a balanced and productive program within the FY 1983 budget, research of lesser priority at several other facilities will be reduced or possibly phased out.

Mr. Chairman, I would now like to focus on the Life Sciences Research and Nuclear Medicine Applications program that is carried out by our Office of Health and Environmental Research.

## LIFE SCIENCES AND NUCLEAR MEDICINE APPLICATIONS

The Life Sciences and Nuclear Medicine Applications program, with an FY 1983 budget request of $39.0 million, consists of two major independent research efforts (Table 4).

Table 4

Life Sciences Research
and Nuclear Medicine Application
Budget Authority
($ in Millions)

| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| General Life Sciences | $26.4 | $18.8 |
| Nuclear Medicine Applications | 19.0 | 18.5 |
| Sub-Total Operating Expenses | 45.4 | 37.3 |
| Capital Equipment | 2.0 | 1.7 |
| TOTAL | $47.4 | $39.0 |

The General Life Sciences program, for which $18.8 million is requested, develops basic knowledge on the structures and functions of normal biological systems. The information developed in this program supports applied research carried out by the Biological and Environmental Research (BER) program of our Office of Health and Environmental Research. The goal of the BER program, which is discussed later in my testimony, is to determine the health and environmental effects of pollutants from energy technology development and use. In order to understand these health effects, we must know more about how human biological systems operate under normal conditions.

With this goal in mind, the General Life Sciences program supports long-term basic research in biophysics, genetics, cell biology, chemical physics and instrumentation. Research in each of these areas contributes to our understanding of the complex biological molecules and other components of cells and living systems. More specifically, we are trying to learn more about how molecules, cells and subcellular structures are damaged temporarily or permanently by pollutants, and what internal mechanisms exist to repair that damage.

In addition to improving our understanding of normal biological processes and their response to energy-related pollutants, the General Life Sciences program has also developed a wide range of commercially useful biomedical instruments used in vaccine production, clinical testing, and cell separation and analysis. More recent advances include ongoing efforts to develop techniques to identify the body's proteins or gene products. If successful, this would allow early detection of abnormal genetic changes and disease states. Recent genetic research on bacterial cells has led to development of the universally used Ames Assay for rapid screening of potentially cancer- or mutation-causing agents.

While the equipment required to carry out this research is many times smaller and less expensive than the accelerators used for High Energy and Nuclear Physics research, these long-term science programs all look to advances in equipment to allow research into previously unexplored areas. The General Life Sciences program supports research in instrumentation sciences to increase our ability to identify and measure rare biological changes. The recently developed fast flow cytometer is one example of new and improved instrumentation that serves as powerful tools to help us understand the effects of pollutants on living systems. With this automated instrument we can now scan hundreds of thousands of living cells in a few minutes to identify abnormal cell structures or numbers of chromosomes as well as mutant cells.

In FY 1983 the General Life Sciences program will continue to provide vital information on the makeup and functions of biological systems. The FY 1983 request would provide for continuing efforts to define the normal structure of key biological molecules and cell components, characterize DNA damage and repair mechanisms and study how tissues may be damaged when the body's cellular defenses are impaired. To accommodate this higher priority research there will be some selected reductions, chiefly in the area of cell biology. The Nuclear Medicine Applications program for which $18.5 million is requested in FY 1983 supports R&D on new ways to use radiation and radioisotopes to diagnose and treat human disease. Nuclear Medicine examinations have been and continue to be important in identifying abnormalities and diseases of the heart, lungs, kidneys, skeleton, central nervous system and other body organs. Many physical problems can now be diagnosed and treated without surgery as a result of these developments in nuclear medicine.

This transfer of the technology into commercial use remains a goal of the program. In fact, the Nuclear Medicine Applications program has produced the technology for more than 60 million nuclear medicine diagnostic and therapeutic procedures performed annually and has developed most of the diagnostic instrumentation now in use in nuclear medicine, including the Positron Emission Transaxial Tomograph (PETT).

While previously available technology was limited to defining an organ's shape and form, the PETT scan can tell how that organ is functioning, and how it reacts biochemically to a variety of conditions. Researchers are using the PETT scan to study blood flow and metabolism in the heart and blood vessels to better understand the mechanisms of heart attacks and strokes. PETT scan studies of the brain are being used to determine therapy for stroke or seizure victims and to better understand certain emotional disorders. The scan also has potential application in determining drug therapy for cancer patients.

Recent advances include the development of labeled pharmaceuticals for use with the PETT scanner to study brain metabolic differences in epilepsy, schizophrenia, stroke and diabetes; improved scanning techniques for bone cancer which have raised two year survival rates sixfold; and development of techniques for successfully treating eye cancer, while preserving vision and for detecting small lung tumors not visible by X-rays.

Research that, in the past, has led to these very important developments will continue in FY 1983. The FY 1983 budget request would also provide for expanded research to gain a better understanding of cardiovascular physiology in man and to achieve earlier diagnosis of cardiovascular disease. Using radioactive compounds, research on residual injury to human cells and organs caused by pollutants also would be completed and research on new forms of nuclear cancer therapy would be initiated.

Finally, $0.7 million of the $1.7 million capital equipment request for General Life Sciences and Nuclear Medicine Applications is requested for completion of the biological beamline at the National Synchrotron Light Source at Brookhaven. The increased beam intensity available at the NSLS will significantly extend this research program by revealing the changing structure of macromolecules, such as DNA, during their biological reactions. This knowledge will advance our understanding about the way pollutant materials modify normal biological processes.

Mr. Chairman, let me briefly comment on General Sciences Program Direction.

## GENERAL SCIENCES PROGRAM DIRECTION

The FY 1983 budget request for General Sciences Program Direction is $2.0 million. These funds are requested to provide for the salaries, benefits, travel and other expenses associated with

36 full-time equivalents in the Office of the Associate Director for High Energy and Nuclear Physics, the Division of High Energy Physics, the Division of Nuclear Physics, Life Sciences Research and Nuclear Medicine Applications program, and associated support staff. The staffing requirements remain constant relative to FY 1982. The increased funding is to provide for normal increased personnel costs such as within grade and merit increases, and benefits.

I would now like to discuss the programs under the Energy Supply R&D appropriation, beginning with Basic Energy Sciences.

## BASIC ENERGY SCIENCES

The Basic Energy Sciences program conducts long-term research to provide a fundamental base of scientific and engineering knowledge for use by government and the private sector to develop new concepts, materials and processes important for energy production and use. Support of this basic research is an investment in our nation's future economic well-being, both in terms of the knowledge produced and the training of university students who will be tomorrow's scientists.

To say that the BES program sponsors research in the physical and biological sciences, engineering and mathematics does not convey the magnitude of a program that supports approximately 1100 research projects a year and provides advanced research facilities that are used by university and industrial researchers as well as national laboratory scientists. Nor does it convey the impact of a research program whose benefits cannot be predicted or scheduled. While we cannot predict the specific long-term impact of most basic research activities, experience during the past few decades makes us confident that the cumulative effect of research underway will be a wealth of new information that will lead to new and improved energy technologies and will enable us to address problems with present energy systems.

The many accomplishments flowing from research carried out by this program during the last year include:

- Development of a new method for fabricating a class of less brittle materials called intermetallic compounds. These compounds have excellent corrosion resistance which is important for energy applications including automotive and industrial uses. In the past, they have seen limited use because of their brittleness.
- Discovery of a new class of chemical compounds that can be used to recover and purify selected valuable elements, such as palladium, from nuclear waste solutions.
- Discovery of a liquid membrane to enrich the oxygen content in air. Oxygen is important for efficient combustion, and crucial for high Btu coal gasification. The new liquid membrane is an improvement over state-of-the-art solid membranes; with it, oxygen-enriched air could be produced at great savings in energy and cost compared to present day technology.
- Discovery of a micro-organism that is capable of converting the waste gas, carbon monoxide, into commercially-valuable, larger molecular weight chemicals such as acetic acid. This conversion, which can be accomplished without energy input from other sources, could provide a more economical process for the chemicals and plastics industries among others.
- Development of a combustion process diagnostic technique that, by improving our understanding of flame constituents and characteristics, will help build our ability to tailor fossil fuels to meet operating requirements of combustion systems and reduce pollutant emissions.

This latter example, the initiation of research on combustion phenomena, is an excellent example of the dynamic nature of the

Basic Energy Sciences program. The BES program does not have a static technological end point toward which it strives. Rather, the program is responsive to new research opportunities and needs that flow both from ongoing research and from work in new areas. The need for combustion research was first identified several years ago when DOE was established. Working with members of the research community and the Department's technology programs, the general needs for combustion research were identified.

It was determined that the longer range technologies would benefit from an improved understanding of combustion processes, including identification of the species present in flames and their concentrations, chemical interactions at the atomic and molecular levels, and a better understanding of fluid dynamics and turbulence in flames and combustion systems. With the needs and opportunities for research on the fundamentals of combustion identified, we undertook design and construction of a unique facility at our Sandia-Livermore Laboratory. This facility was designed around the special experience in laser diagnostics that had been developed at the Laboratory to serve nuclear weapons needs. The Combustion Research Facility (CRF) was dedicated during 1981 and has been designated as a user facility where DOE-supported scientists from various locations, university researchers and privately-supported industrial researchers alike can conduct research. Work at the CRF has implications not only for improved fuels, but for higher efficiency engines, cleaner and more efficient coal combustion, and knowledge on the extent and future control of pollutants.

Other promising areas of research supported by BES have wide-ranging applications. Energy storage needs associated with solar energy, electric vehicles, and central station power plants are being investigated by BES-sponsored research in a number of areas, including chemical reaction kinetics, solid electrolytes, high temperature thermodynamics, electrodes and electrochemistry, high temperature corrosion, and diffusion and gas transport. While these areas of fundamental research are, no doubt, foreign to the average person, I can assure you that investigations into their domain are essential if we are to make significant improvements in our current technologies and develop new ones. Similarly, in response to the need for long-term safe isolation of nuclear wastes, BES is supporting research in radiation effects on materials, thermodynamics of ceramics and brines, fluid flow in porous media, canister materials, actinide chemistry, mechanical and transport properties in geologic systems and other areas. This research provides important additional information to help us resolve issues related to nuclear waste management such as permanent disposal, interim storage, and separation of nuclear waste components.

In order to maintain the kind of high quality research I have just described, we must continue the strong core program that now exists. We must also be able to expand research in emerging priority areas not yet included in the core program as well as maintain, operate and update the major facilities required to carry out the research.

The FY 1983 budget request for Basic Energy Sciences is $282.9 million (Table 5). Of that amount, $261.3 million is for operating expenses; $18.2 million is for capital equipment; and $3.4 million is for construction. This is an increase of $39.6 million over the FY 1982 appropriation for this program. However, 17% of this increase is for the Stanford Synchrotron Radiation Laboratory (SSRL), currently supported by the National Science Foundation. The budget increase reflects, in part, a $6.8 million interagency transfer for SSRL. At the requested funding level for FY 1983, most of the ongoing core programs would be supported although some reductions would still be required in the larger subprograms so that we can support increases for major facility operation and research. Although some program expansion would be possible in the newer subprograms of Biological Energy Research, Advanced Energy Projects and Engineering, Mathematics and Geosciences, most of the increase would support the operation of BES's major research facilities, including the SSRL.

Table 5

Basic Energy Sciences
Budget Authority
($ in millions)

| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| Operating Expenses | $226 3 | $261.3 |
| Capital Equipment | 16.4 | 18.2 |
| Construction | 0.6 | 3.4 |
| Total | $243.3 | $282.9 |

Adequate support of the BES scientific facilities is vital to the productivity of these programs. These facilities include not only the Combustion Research Facility, but synchrotron light sources, research reactors, the Intense Pulsed Neutron Source and large electron microscope facilities at the DOE laboratories. These research facilities provide capabilities that are, in most cases, unique in the U.S. and in some cases in the world. They are available to the agency's technology programs as well as to a wide spectrum of the scientific, academic and industrial communities. The costs of maintaining, operating and updating these facilities have been steadily increasing as a result of escalating power costs, significant increases in costs for fabricating new nuclear fuel elements and costs for operating newer facilities as they are completed. Additional funds requested for FY 1983 are mainly to operate the major facilities near their FY 1982 levels, although funding for the newer National Synchrotron Light Source, the Intensed Pulsed Neutron Source and the Combustion Research Facility still would not allow operation at optimum levels.

The FY 1983 budget for BES includes a number of programmatic shifts of funding and management responsibility. As mentioned earlier, the BES program will assume full budget and management responsibility for the Stanford Synchrotron Radiation Laboratory previously supported by the National Science Foundation. SSRL is a national user research laboratory associated with the High Energy Physics facility known as SPEAR located at the Stanford Linear Accelerator Center (SLAC). In addition to serving the High Energy Physics program, the SPEAR facility provides synchrotron radiation to SSRL for research in materials and chemical sciences, physics, engineering, biology and basic and applied subfields.

The transfer is part of the Administration's effort to improve management and planning for national user facilities by assigning to a single agency lead responsibility for a facility. The shift brings support for the two major synchrotron radiation user facilities, SSRL and the National Synchrotron Light Source at Brookhaven National Laboratory, into a single appropriation.

The second programmatic change involves the transfer of all low energy nuclear physics research from the Basic Energy Sciences program to the Nuclear Physics program. This change transfers $12.8 million in FY 1983 from BES to the Nuclear Physics program and represents a management decision to consolidate both management and budget responsibility for all basic nuclear physics research in a single program. The nuclear data and isotopes production activities remain in BES.

Finally, the budget for BES includes shifting of operational and funding responsibility for research reactors to specific single subprograms within BES. Previously, funding responsibility was shared by several other ER programs. This change streamlines responsibility and management accountability for the research reactors.

The next program I will discuss is Biological and Environmental Research.

## BIOLOGICAL AND ENVIRONMENTAL RESEARCH

As a result of research supported by the Biological and Environmental Research (BER) program, we are gaining a better understanding of the ways in which energy-related pollutants affect human health and the environment. More specifically, the BER program supports long-term research to determine the physical and chemical nature of energy-related products and waste material; to understand how pollutants move through and are changed in the environment; and finally, to identify pollutants that are toxic to humans and understand quantitatively how those pollutants affect living organisms, including humans. The information developed by this program and by the Life Sciences program allows early analyses of biological issues in parallel with technological and economic analyses of energy options. I believe that this is a far more productive and cost-effective approach than "after the fact" research and imposition of corrective measures such as retrofits and operating restrictions.

The BER program, which is carried out at the agency's multiprogram laboratories, specialized biomedical and environmental labs and over 75 universities, hospitals and research institutions across the country, has made and will continue to make significant contributions to our understanding of biological and environmental systems. As with any long-term scientific research program, a recitation of only a few research accomplishments, particularly recent ones, often does not convey the true importance and implications of a program. With the perspective of time, however, I believe that the very broad impact of the BER program can be seen. As a result of some 30 years of BER-supported basic and applied research, the fundamental principles of radiation biology are now known and understood. This knowledge provides the basis for setting radiation protection guidelines, and aids in the beneficial use of ionizing radiation and radionuclides in medicine, agriculture and other fields. The radiation instrumentation research program is largely responsible for the current state-of-the-art detection systems; and research related to radiation health protection has produced most of the radiation dosimetry techniques in use today. In addition, the entire field of radioecology was developed under the BER program. Research in radioecology, which studies the effects of radiation on and through the environment, has led to new insight and breakthroughs in understanding the cycling and fate of pollutants in the environment and food chain. Developments in radioecology established the concept of studying the environment as an integrated medium for the cycling and transport of pollutants.

Some of our more recent accomplishments include the following:

- Development of an efficient method for integrating two types of analyses to test for toxic pollutants. By analyzing chemically complex mixtures, such as coal conversion products, and testing the mixture's components for mutagenic or carcinogenic properties, it has been found that a single class of organic compounds, representing only a few percent of the total mass of the mixture, is responsible for over 90 percent of the total biological hazard.

- Development of a laser fluorescence system called the "spill-spotter" that is now being used in coal conversion operations to detect contamination of surfaces by organic material. This system aids considerably in reducing worker exposure to these materials.

- Development and application of new, sensitive techniques that detect toxic effects resulting from human exposure to energy-related chemicals and radiation. These include blood cell tests that measure genetic damage to the whole body, methods to identify abnormal proteins in body fluids and tissue, and methods to detect genetically controlled skeletal abnormalities.

- In a continuing study of atomic bomb survivors of Hiroshima and Nagasaki and their first-generation offspring, it was found that there were no significant genetic effects or growth retardation; however, strong relationships were shown between radiation dose and certain cancer incidence rates, mental retardation and other effects related to exposure in the womb.

- Preparation of maps showing the sensitivity of different Arctic environments to particular stresses. These are being utilized by federal, state, and industry personnel in Alaska to select optimal sites for energy-related activities and to determine areas that should get immediate attention after accidental spills.

These accomplishments, past and present, have two common elements. Their benefits become evident only over the long-term and are made possible by Federally-funded research. It is reasonable to assume that industry will carry out the research necessary to comply with Federal and state health and environmental regulations. However, it is both appropriate and necessary for the Federal government to support long-term research on the wide-ranging health and environmental implications of a variety of energy technologies. Federally-sponsored biological and environmental research, such as that supported by the BER program, can help us, as a Nation, to compare some of the cost and benefits of technology options and make wise choices.

The FY 1983 budget request for the BER program is $129.8 million (Table 6). Included in this request is $121.3 million for operating expenses, $7.5 million for capital equipment and

$1.0 million for construction. The FY 1983 request represents a decrease of $35.1 million below the FY 1982 budget. That decrease is largely in operating expenses and represents a shift in emphasis toward analyzing the long-term generic health and environmental effects associated with the production and use of various energy options, with less emphasis on short-term, process-specific research.

The proposed FY 1983 budget would support those efforts that neither industry, regulatory agencies or basic health science agencies will address. The FY 1983 budget request would sustain long-term research to define more precisely the quantitative risk estimates for cancer, genetic effects, and other biological changes following acute and chronic low doses of radiation exposures in animals and exposed human populations. Although reduced support would be provided for health and environmental research and assessment of synthetic fuels derived from coal and oil shale, and of renewable resources, the longer-term issues associated with these nonnuclear activities would continue to be investigated. The FY 1983 budget also would support continued research to analyze the movement and dispersion of pollutants in the atmosphere, fresh water, terrestrial and marine environments; to develop enhanced

Table 6

Biological and Environmental Research
Budget Authority
($ in millions)

| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| Operating Expenses | $151.3 | $121.3 |
| Capital Equipment | 9.7 | 7.5 |
| Construction | 4.0 | 1.0 |
| Total | $165.0 | $129.8 |

pollutant detection and measurement instruments and to analyze the interactions between energy-related chemical and physical pollutants with living organisms. The capital equipment request of $7.5 million would allow us to replace and maintain the specialized and sophisticated equipment needed to support the research program. The construction request of $1.0 million would be allotted to general plant projects.

Next, let me turn to the Magnetic Fusion Energy program.

## MAGNETIC FUSION ENERGY

Fusion has the potential of becoming a principal energy option for the nation early in the next century. This potential is based on a number of important features. For example, the fuel reserves for fusion are vast, readily available to all, and are free from the threat of embargo. The environmental and safety aspects of fusion reactors appear to be acceptable; and there are multiple perceived end uses for fusion energy. Although electricity generation is an obvious application, other uses are possible as well, including breeding fissile material for fission plants, generating very high grade heat for industrial applications, and the direct production of synthetic fuels.

Because of both the cost and the long-term nature of this highly complex scientific and engineering program, it is the Administration's policy that fusion is an appropriate program for federal support. It is not the Department's policy to take the shortest road, irrespective of cost, to fusion power production, nor the most expedient, if that road does not lead to a realization of a socially desirable fusion system. Rather our aim is to find the best road for developing this complex field of science and technology to ensure that we develop fusion systems that are both environmentally sound and economically competitive. To accomplish this objective, we must provide a base of understanding and knowlege from which sound judgments can be made on the most economical and practical way to develop one of the last known sources of energy - the energy source of the stars.

The program's long-term strategy is to conduct a broad-based program along two concurrent lines. One line is the engineering effort aimed at developing experience with the practical problems of creating and maintaining a burning plasma. A Fusion Engineering Device (FED) integrating the engineering technology required for practical utilization of a burning plasma, will be the central element of this effort. The other line is one of scientific investigation involving two principal goals: (1) development of reactor concepts that promise reactor characteristics significantly better than current concepts; and (2) resolution of the remaining technical issues crucial to the production of the burning plasma. The synthesis of these two efforts will help us to demonstrate fusion's engineering feasibility and lay the groundwork for a rational assessment of fusion's highest potential as a practical energy source. While the program's long-term strategy involves these two lines of investigation, the current program is devoted primarily to exploring the physical properties of burning plasmas under conditions that approach temperatures and confinement parameters that must be reached to demonstrate scientific feasibility.

The scientific and engineering feasibility goals are a logical outgrowth of the Fusion program's thirty year history. That historical continuum reflects the many changes that have occurred in what has become a very complex and expensive program. Early researchers were optimistic that fusion could be controlled and turned easily to the production of energy. That optimism was dispelled in the late 1950's when it became clear that substantial scientific research would be needed before scientists would be able to confine plasma gases long enough and at high enough densities and temperatures to produce a net energy gain. During the 1970's, systematic progress occurred on a broad front as the result of a carefully planned program. The required temperatures for self-sustaining releases of fusion energy were achieved in several experimental devices and vast improvements in plasma confinement were achieved. We can now predict with confidence that net energy producing systems are possible; and it is now generally acknowledged that there are a variety of scientific paths to practical fusion reactors.

The term magnetic fusion stems from the fact that the fusion fuel consists of charged isotopes of the element hydrogen which are contained or "confined" by magnetic fields within a vessel. There are two main classes of experimental magnetic fusion devices, open and closed. Closed systems, of which the tokamaks are the best known, are systems within which the magnetic field lines circle in on themselves in the shape of a doughnut or toroid. Although much work remains to perfect the closed magnetic concepts in general, the tokamak is the best understood of all magnetic confinement devices and, therefore, the most advanced fusion concept.

The mirror concept is an open system where the magnetic field lines are squeezed near the end of a straight section to retard leakage of the fusion fuel. These cylindrical-shaped devices are referred to as mirrors because most of the particles are reflected back rather than escaping from the ends. In recent years, significant progress has been made in improving this device.

Through research into these two confinement systems, fusion research also has advanced the state-of-the-art in important and diverse technologies, including superconducting magnets, high power radiofrequency tubes and hardware, advanced materials development and mathematical methods for computers. Much of this technology is applicable to other fields. Fusion also makes important contributions in advancing electronics, computer control systems, optics and many other areas.

The Fusion program has made significant scientific progress in recent years. In the Confinement subprogram, new plasma heating techniques were tested and detailed studies were carried out on plasma confinement and scaling. Advances were made in superconducting magnets. Preliminary concept definition studies for a Fusion Engineering Device, the central element of the engineering phase of the program, were completed and progress was made on continuing and completing major facility upgrades and construction of new technology facilities.

Under the Confinement subprogram in the tokamak area, assembly and check-out of virtually all systems for the Tokamak Fusion Test Reactor (TFTR) at the Princeton Plasma Physics Laboratory will be completed in December, 1982 in preparation for reactor operation and, ultimately, demonstration of scientific feasibility. The Doublet III tokamak will be upgraded with a new larger D-shaped vacuum vessel to verify theoretical predictions that the D shape allows for a higher plasma beta. ("Beta" is a term which describes the ratio of the plasma pressure to the magnetic field. The higher the "beta", the better confined is the plasma.) The higher beta is a crucial element in the design of a Fusion Engineering Device. Other tokamak test facilities will continue investigations of the scaling of the fusion parameters of confinement time and plasma beta; and a new modest-sized advanced toroidal facility will be initiated to exploit recent scientific advances.

Activities related to the mirror program in the confinement area include continued construction, although at a slower pace than previously planned, of the Mirror Fusion Test Facility-B (MFTF-B) at Lawrence Livermore National Laboratory. MFTF-B is a major scaling experiment for the thermal-barrier tandem mirror concept. When completed, MFTF-B will be the largest facility in the world capable of investigating the mirror fusion concept. In a series of tests completed February 4, 1982, the superconducting magnet was successfully tested at its full design operating current. The MFTF-B magnet is the largest superconducting magnet in the world, weighing in at 789,000 pounds and standing 25 feet high. With MFTF-B, mirror plasma parameters 100 times beyond those of current experiments can be investigated. The key scientific issues of the thermal barrier concept will continue to be addressed in the near-term in the recently-completed Tandem Mirror Experiment-Upgrade (TMX-U) at Lawrence Livermore Laboratory. Thermal barriers are produced with microwave heating and neutral beam pumping to improve the operating performance by allowing hotter plasmas to be confined for a longer time and improving the ion stability. Results from tests of thermal barriers on the TMX-U will be used to optimize experiments on MFTF-B. Further advances on thermal barriers are also being made with current efforts concentrated on axisymmetric configurations. The TARA mirror experiment at MIT is being constructed to investigate this improvement in thermal-barrier tandem mirror design.

In the Development and Technology subprogram, construction is being completed on the Large Coil Test Facility at Oak Ridge National Laboratory where six large field superconducting coils will be tested, including three from U.S. industrial participants. The Tritium System Test Assembly facility will also begin operations to develop the technologies essential to the deuterium-tritium fuel cycle.

The activities in FY 1982 and plans for FY 1983 emphasize scientific rather than engineering activities largely as a result of the need to reduce Government expenditures. We have made some necessary, difficult decisions that will require delays, stretch-outs and some postponements of several large construction projects. Although we cannot follow an ambitious funding path this year, these decisions were based on the goal of maintaining enough flexibility so that the key scientific and technical issues in the toroidal and mirror programs will continue to be addressed.

The FY 1983 budget request for the Fusion program is $444.1 million (Table 7). Of that amount, $358.6 million is for operating expenses; $39.5 million is for capital equipment; and $46.0 million is for construction. The total budget request represents a decrease of $9.7 million from the FY 1982 level. This change results from an increase of $65.9 million to the operating budget offset by decreases of $2.5 million in capital equipment and $73.1 million in construction.

The increase in the operating budget provides for maintaining essentially the FY 1982 level of effort in the Applied Plasma Physics activity which supports research performed on the mainline devices aimed at providing new understanding, techniques, and concepts. The FY 1982 level of effort in the Development and Technology subprogram also would be maintained in FY 1983. This subprogram develops the engineering and technological bases needed to demonstrate the engineering feasibility of fusion, including the design studies for a Fusion Engineering Device. During FY 1982, the Fusion Engineering Design Center at ORNL is continuing detailed engineering for the FED preconceptual reference case design. Physics investigations also are being carried out with the aim of developing advanced concepts to improve the reference case design. In FY 1983, a small effort will maintain the capability to start detailed design work on the FED in the future. Specifically, the FED design will be kept up-to-date and new physics results will be evaluated in terms of their potential impact on FED design. Thus, results

Table 7

Magnetic Fusion Energy
Budget Authority
($ in millions)

| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| Operating Expenses | $292.7 | $358.6 |
| Capital Equipment | 42.0 | 39.5 |
| Construction | 119.1 | 46.0 |
| Total | $453.8 | $444.1 |

of the base scientific program will feed into FED with the dual goal of reducing scientific uncertainty and producing a design that will result in increased performance and cost effectiveness.

Under the Planning and Projects subprogram in FY 1983, work will continue on both the Tokamak flexibility modification to TFTR and the MFTF-B construction project. Increases in the Confinement Systems subprogram would restore operating levels in toroidal experimental devices to FY 1981 levels and allow us to initiate efforts on the fabrication and upgrade of two critical toroidal devices, the Advanced Toroidal Facility and Doublet III. In addition, assembly and preparations for operation of TFTR will be completed and TFTR will begin operations.

The decrease in the construction request reflects, in part, TFTR's transition from a construction to an operational phase. It also reflects decreases in EBT-P and FMIT construction funding. Due to budget stringencies, these two projects will not be funded for construction in FY 1983 and MFTF-B will be funded at a rate below the planned level.

The budget request I have just described would support a meaningful scientific program. It would allow us to pursue important research efforts logically and efficiently with the goal of developing a sufficient base of information to allow technology development to proceed with minimum risk in the future.

I will now describe the Energy Research Analyses, University Research Support, and General Purpose Facilities programs. The FY 1983 budget request for these programs is shown in Table 8 following my discussion of the programs. Before I discuss these outlay progams, however, I would like to comment on the advisory responsibilities of the Director of Energy Research.

## ADVISORY AND ASSESSMENT ACTIVITIES

The Director's advisory responsibilities include serving as the principal science advisor to the Secretary on energy R&D programs, on oversight of the non-weapons multiprogram laboratories and on the education and training of scientists and engineers. The Office of Energy Research also provides staff support to the Energy Research Advisory Board (ERAB) whose members advise the Secretary on the Department's energy R&D programs. The Board's membership includes representatives from industry, universities, energy users, state and local governments and public interest groups. ERAB now reports directly to the Deputy Secretary of the Department of Energy. Staff support is provided through ER's Director of Science and Technology Affairs Staff.

Within the Office of Energy Research, the Office of Field Operations Management and the Office of Program Analysis (OPA) support the Director's advisory responsibilities. The Office of Field Operations Management supports the Director with regard to oversight of the laboratories and energy-related manpower development and training activities. This Office has developed several management tools used by the Department in administering its laboratories and R&D facilities across the country and continues to manage the University Research Support and the Multiprogram General Purpose Facilties outlay programs that I will discuss shortly. The Office of Program Analysis, on the other hand, provides energy research analysis support.

## ENERGY RESEARCH ANALYSES

The FY 1983 budget request for Energy Research Analyses is $2.6 million (Table 8). The Office of Program Analysis (OPA) administers the Energy Research Analyses program and provides technical support to the agency through the Director of the Office of Energy Research. The functions and activities of this program include:

1. Assessment of the adequacy of the long-range (technology base) research in support of the agency's programs to develop energy options.
2. Independent analyses and technology assessments of the agency's research and development programs to provide technical review for quality and relevance.
3. Coordination and liaison for resolution of major Departmental technical issues and research policy development.

Typical of the technology base assessment function was the assemblage of a prestigious group of industrial and university scientists to assess the long-range research needs in coal gasification, coal liquefication and oil shale. These assessments have been used by the agency to assess the development of R&D programs, by the Synthetic Fuel Corporation to assess project readiness and by industries to define their own research agendas. Similar studies addressed biomass and plant-derived hydrocarbons, salinity gradient solar ponds, materials research needs to improve performance, and durability of solar heating and cooling systems.

Independent analyses of programs such as alcohol fuels, the use of methanol for automotive transportation and electrochemical storage were carried out during the past year to provide management with a realistic assessment of their technological status and potential. In addition, OPA has provided an in depth review of the quality and relevance of research programs supported by the Office of Energy Research, including Basic Energy Sciences and Health and Environmental Research.

Activities related to Departmental and interagency coordination of technical issues including civil operational remote land sensing from space, strategic minerals and acid rain were carried out in FY 1982. Currently, OPA assists in the planning of agency-supported acid rain research, coordinates acid rain issues and activities across agency offices, and represents the agency on the Interagency Task Force on Acid Precipitation. Also, OPA has initiated the development of a goal-oriented comprehensive R&D plan for all Federal acid rain research. These activities are expected to continue in FY 1983.

The FY 1983 budget request would provide for: (1) approximately five ER-initiated major technology area assessments; (2) an update of portions of the agency's Technology Base Assessment; and (3) selected technology studies as requested by senior DOE management.

## UNIVERSITY RESEARCH SUPPORT

The agency's major contribution to university education and training of new professional-level manpower is through the funding of the highest quality individual research proposals involving both faculty members and graduate students. We estimate that over 6,000 graduate students currently are supported by DOE, either directly on research projects or indirectly through the laboratories. The agency is also a significant user of technical manpower. Its 57 plants and laboratories alone utilize over 100,000 contractor employees.

It is our specific policy to support energy research and training programs aimed at the utilization of unique agency laboratories and equipment by both university faculty and students. We also provide support for refueling specialized university nuclear research and training reactors located across the country. These activities, in addition to the direct support of university researchers provided by our own basic research programs, continue to be appropriate and effective energy research education and training programs. They are aimed at securing top quality energy researchers and at broadening the pool of experienced scientists from which Government, universities and industry draw trained scientific manpower. The FY 1983 budget request of $5.1 million, a reduction of $5.5M from FY 1982, would concentrate these efforts in two high priority areas (Table 8).

The first is the University Reactor Fuel Assistance Program, which supports university nuclear research and training reactors on university campuses. The program specifically provides support for the fabrication and related shipping costs of the nuclear fuel used in university reactors. There currently are 54 such reactors in operation in the U.S. Without our support, most of these reactors would be hard pressed to continue their dual functions of nuclear research and the training of undergraduate and graduate students in nuclear science and engineering. The FY 1983 request of $1.6 million would allow us to fuel up to five reactors plus associated spent fuel shipping and partial support for reactor operational costs when these reactors are "shared" with researchers at neighboring schools.

The other high priority URS activity is the University-Laboratory Cooperative Program. This program (along with user research facilities) is one of the most important mechanisms we have to sustain the close working relationships between our National Laboratories and the academic community. Through this program we support a range of faculty and student research participation activities at all of our major Laboratories. In many cases, these are summer research programs, while in other cases research appointments for faculty members and graduate students are made for an entire academic year. The requested budget for this program in FY 1983 of $3.5 million will support an estimated 2,000 university participants throughout the Laboratory network. Special emphasis again will be placed on providing research opportunties for engineering faculty and students.

## MULTIPROGRAM GENERAL PURPOSE FACILITIES

The Multiprogram General Purpose Facilities program, initiated in FY 1981, provides a mechanism for rehabilitating and replacing non-defense general support facilities which are essential to the continued effective and safe operation of the multiprogram laboratories. These facilities include roads, railroads, site utilities and support buildings such as laboratories and office buildings.

The 12 multiprogram labs serviced by this program received over $3.1 billion in FY 1981 to carry out the agency's technology and basic research programs. The replacement costs of the existing facilities exceeds $8 billion. A backlog of $2 billion worth of GPF improvements has developed over the years. This program has begun to address that backlog and has taken management steps to assure that the problems responsible for the backlog will be corrected.

During stringent budget years it is often tempting to postpone necessary replacement or rehabilitation of deficient facilities in favor of maintaining the maximum amount of program effort possible. We have learned from the experience of our predecessor agencies that such expediencies lead to negative impacts on the very programs they aimed to protect and also result in an inventory of billions of dollars in corrective measures which some future generation will be expected to undertake. We plan, therefore, to continue the MGPF program, which began in FY 1981, as a necessary cost of doing business as long as the multiprogram laboratory facilities are utilized to perform research and development functions for the agency.

The FY 1983 request of $34.0 million would allow continued construction on ten projects started in prior years and this year and would fund initiation of four critical new projects in FY 1983 (Table 8). This represents a slight increase over the $32.6 million appropriated in FY 1982.

## ADVISORY AND OVERSIGHT PROGRAM DIRECTION AND POLICY AND MANAGEMENT

The FY 1983 budget request for Advisory and Oversight Program Direction is $3.2 million, a net decrease of $0.1 million from the FY 1982 level. These funds are required to provide for the salaries, benefits, travel, and other expenses associated with 41 full-time equivalents funded by this program. This staffing level represents a decrease of 15 full-time equivalents from the FY 1982 level. The decreased salary requirements associated with that staffing reduction are partially offset by increased requirements such as normal salary and benefits increases for remaining staff, and severance pay.

The FY 1983 budget request for Policy and Management is $0.4 million, a decrease of $0.6 million from the FY 1982 level. These funds are required to provide for the salaries and related expenses associated with 8 full-time equivalents in the immediate offices of the Director, Office of Energy Research, and the Director, Office of Management. This staffing level represents a reduction of 14 full-time equivalents from FY 1982.

Mr. Chairman, this concludes my testimony. I would be pleased to answer any questions at this time.

Table 8

Energy Research Analyses, University Research Support,
Multiprogram General Purpose Facilities
Budget Authority
($ in millions)

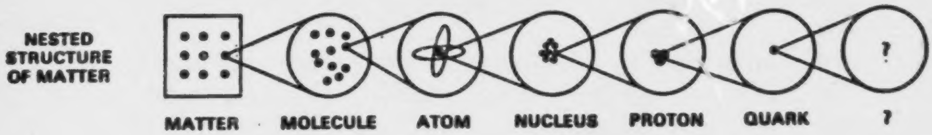
| | FY 1982 Estimate | FY 1983 Estimate |
|---|---|---|
| Energy Research Analyses | $ 3.0 | $ 2.6 |
| University Research Support | 10.6 | 5.1 |
| Multiprogram General Purpose Facilities | 32.6 | 34.0 |

## ENERGY RESEARCH OVERVIEW

Dr. TRIVELPIECE. The two appropriation accounts that I am going to talk about are the general sciences and research appropriation, which is $601 million in fiscal year 1983, and the portion of the energy supply research and development appropriation, which includes $902 million for the energy research programs under my cognizance. The programs and activities that are managed under these accounts are really too numerous to describe in detail, and what I would like to do in the time that is available is just to give you an overview of some of the activities that are involved, some of the recent accomplishments, and some of the more interesting recent developments.

To begin the overview, what I would like to do is have you turn to the book I have provided to the subcommittee which includes photographs instead of viewgraphs. In this first chart, what I have done is try to provide a schematic diagram which I plan to use as a tour guide to identify the collection of things that we are doing.

BASIC CONSTITUENTS OF MATTER



## STATUS OF MATTER

Everyone is familiar with the normal states of matter which include solids, liquids, and gases. Ice is an example of how you go from a solid to a liquid to a gas. If you add heat to ice, you make liquid; if you add more heat, you create steam. In each case, you are using the same molecule, which is $H_2O$, water, which is made up of atoms of hydrogen and oxygen. It turns out that if you add still more heat to a gas like steam or, in fact, any gas, you create a new kind of a gas which is the so-called fourth state of matter, which is plasma. That is, you create a gas which is made up of electrons and the nuclei of atoms. It's that gas which is the fundamental element that is in fusion reactors that we hope to be able to heat and contain and bring to high enough temperature to cause it to react.

Although it is not a precise idea, in a sense if you continue to add heat, what you do eventually is cause the nucleus of the atom itself to come apart, at least temporarily, and it, of course, has its own individual component parts which are protons and neutrons.

If you add still additional heat, you discover that you can cause the protons and neutrons themselves to come apart and, of course, they contain parts which are now referred to as quarks. Quarks are thought to be the fundamental building blocks of nature. They may or may not prove to be the fundamental building blocks.

Senator JOHNSTON. The leptons are the negatively charged quarks?

Dr. TRIVELPIECE. No; the quarks and the leptons are two families of particles from which all other matter is made.

### CONCEPT AND TOOLS OF BASIC RESEARCH

What I wanted to do is give you some illustrations of some of the kinds of tools used in these research programs. Roughly, the problem with this kind of science in the area of physics is approximately like being given a bale of hay in which somebody has hidden a few billiard balls. Your chore is to find out where the billiard balls are and how big they are. One way is to take a rifle and shoot bullets through the bale of hay. You can deduce what there was in the way of billiard balls inside this bale of hay. That could get a bit frustrating shooting little rifle bullets. Maybe you get a little ambitious and get a bowling ball or cannon ball and throw that at the bale of hay and cause the hay to break up into lots of pieces and watch where all the billiard balls come out and take a look at them.

The other thing you can imagine doing is taking the whole bale of hay all by itself and throwing it at a brick wall. If you throw it at a brick wall and it breaks itself into pieces, you can see where all the pieces are located. Or you might consider, say, taking two bales of hay and slamming them together very rapidly in a way that would cause the pieces——

Senator JOHNSTON. You are describing your linear accelerator——

Dr. TRIVELPIECE. I am describing all sorts of things. It is an analogy I am going to use to describe why we have some of the kinds of facilities we have and what they do. The point is, in making this an analogy with states of matter, you have to realize in matter, of course, the equivalent of bales of hay, once they have been taken apart, snap back together in a very short period of time. So what you need is an ability to essentially photograph the constituent parts after they have been blown apart but before they collapse back together again. That is why a lot of very complicated detectors are included in many of the facilities used in the high-energy physics programs.

What you need in order to look at the inside of an atom then is a collection of different kinds of bullets, and so on.

## FIRST CYCLOTRON

Let me show you one of the tools that was among the first ones that was used. The Lawrence Berkeley Laboratory this year celebrated its 50th anniversary. Shown in this photograph is Dr. Ernest O. Lawrence, who received the Nobel Prize in 1939 for his invention of the cyclotron. This picture shows the magnet and some of the structure associated with the first cyclotron.

What this machine did was create one of the kinds of bullets I described earlier. The kind of bullets that are used in these experiments are essentially the individual component parts of the atoms themselves. This machine produced a relatively low energy, but, nevertheless, was one of the watershed tools that was used to begin to explore the characteristics of the nucleus of atoms.

What has happened since is that from this rather modest device an ability has been developed to cause charged particles, which used to go around in circular orbits a few inches in diameter to now go around in a circle which is 6.28 kilometers in circumference as in the accelerator ring at Fermilab. That facility provides bullets whose energy is 400,000 times greater than that which was produced by the early experiment that Dr. Lawrence and his student, Dr. Livingston, were doing.

## FERMILAB

In this device, a beam of charged particles starts out at the area marked linac and is accelerated into circular orbits and then injected into a large main accelerator ring. From there that beam of particles is allowed to go out and strike a target. The individual parts of the atoms or, in this case—we are now talking about the parts of the protons themselves—the quarks and other things continue to the experimental areas. Those subatomic particles are investigated by the experiments that are taking place at the ends of these beam lines as illustrated here.

This area of experimental science has made great demands on technology. The technology has caused it to grow and it has caused technology to grow.

The next picture shows the inside of the Fermilab main accelerator tunnel. The upper collection of things in the picture are the magnets in the original ring that provide the magnetic field. It is the same, in general, as the magnetic field that was in Lawrence's cyclotron. This magnetic field guides the charged particles around this 6-kilometer ring while they are given additional energy before they are delivered to the target. The cost of electricity for putting the magnets into operation is rather substantial.

## SUPERCONDUCTING MAGNETS

There is a phenomenon called superconductivity which permits you to have currents going through wires at very low electrical losses. The magnets you see below are superconducting magnets. They are part of an upgraded system called the energy saver. It provides the opportunity to create still higher energy-charged particle beams without having the electricity bill for this collection of apparatus become unacceptably high.

Senator Johnston. Are those very cold?

Dr. Trivelpiece. Yes; the temperature of the magnets is kept down at a few degrees above absolute zero. It is difficult to manufacture those magnets.

### Clinton P. Anderson Meson Physics Facility

The next photograph is an aerial view of the Clinton P. Anderson meson physics facility at Los Alamos National Laboratory. This facility is operated, not to determine what the fundamental constituents of matter are, but to examine the nucleus.

How does the nucleus rearrange itself into various configurations?

The Los Alamos facility produces a higher current beam of charged particles which allows you to explore some ways in which the nucleus of the atom itself gets rearranged. One of the outgrowths of this has been the knowledge that one of the subatomic particles that is created by this beam has the property of penetrating human tissue without causing damage while it is going in, but when it reaches a certain depth, it produces essentially a minor explosion.

Senator Johnston. That is the ion?

Dr. Trivelpiece. Pion, pion cancer therapy.

Senator Johnston. They do that with ions as well.

Dr. Trivelpiece. It is an ion beam that comes in here. The ion beam is converted to a pi meson beam. The pi meson beam is then allowed to go into human tissue and it goes a certain depth before it explodes.

If you arrange the energy correctly, you can cause it to explode inside a tumorous mass.

## NUCLEAR MEDICINE APPLICATIONS

**ON THE AVERAGE, A NUCLEAR MEDICINE PROCEDURE IS PERFORMED ON ONE OUT OF EVERY TWO PEOPLE ADMITTED TO HOSPITALS IN THE U.S.**

**AREAS WHEREIN NUCLEAR MEDICINE PROCEDURES ARE USED:**

- ORGAN IMAGING TO DIAGNOSE AND EVALUATE CONDITIONS RELATED TO:
  - HEART
  - LUNGS
  - BRAIN
  - LIVER
  - PANCREAS
  - SPLEEN
  - BLOOD
  - BONES
- CANCER DIAGNOSIS AND THERAPY
- PEDIATRIC NUCLEAR MEDICINE
- ACCURATE, RAPID BLOOD ANALYSES FOR A VARIETY OF MEDICAL DISORDERS THAT COULD NOT HAVE BEEN EASILY IDENTIFIED PREVIOUSLY (E.G., INSULIN LEVELS, DRUG LEVELS USED IN TREATING CARDIAC CONDITIONS).

## NUCLEAR MEDICINE APPLICATIONS

That leads me to the next chart, then, which is the one that talks about nuclear medicine applications. What I wanted to point out here is the Atomic Energy Commission, when it was created, had built into its legislation two things: One I would call an offensive strategy and the other a defensive strategy. The offensive strategy is to look for useful things atomic energy can do, not only in terms of producing power, but in terms of curing or diagnosing disease.

The other part is defensive strategy and that is to clearly understand what the potential negative things are that might occur as a result of radiation or atomic energy related matters.

This picture indicates that one out of two people admitted to a hospital in the United States as nuclear medicine applications used on him. In fact, the information on that is wrong. There are two nuclear medicine applications applied to every person who enters a hospital in the United States. That is a multibillion dollar industry in the United States. And if you ask, has this been a good thing for the United States to have done, I think the answer is an unequivocal "Yes." The return on investment alone, without regard to saving of human life, is rather substantial. The taxpayers have undoubtedly benefited enormously from this.

The next picture in your book illustrates something in the nuclear medicine applications program. It shows an individual being put inside a detector. The detector is similar to those kinds of detectors that are used for measuring the property of particles in high-energy physics. Somewhere off the scene is a cyclotron which is being used to assist in the preparation of some material that is injected into this individual. The material goes directly to the brain and emits a small quantity of radiation which can be detected. That small quantity of radiation is proportional to the metabolism of that area of the brain at that particular instant in time.

This rather pretty picture here is a computer-generated photo of a slice of a human brain showing the levels of activity within the brain. The color code on the right indicates levels of activity.

Red is more active; blue is less active. There is an interesting possibility here; that is, to use this diagnostic tool to study various kinds of emotional disorders in a way that permits you to perform chemical drug experiments and determine whether or not there has been any beneficial effect.

What you are looking at is, in a sense, looking down on the top of a brain. The upper portion represents those portions of the brain where the eye optic nerves terminate. So this is where sight and other things are being unscrambled by your brain.

As you can see, individuals that are in advance stages of senile dementia have essentially very inactive brain metabolism.

Senator JOHNSTON. Let me ask you this: I am sold on the program of nuclear medicine. Why do you go down from $47.4 to $39 million on life sciences research and nuclear medicine applications?

Dr. TRIVELPIECE. We have had to adjust to the budget circumstances in which we find ourselves.

### HIGH-ENERGY PHYSICS TERMINOLOGY

Senator JOHNSTON. How are you doing with finding all of the pieces of quarks and leptons?

It seems to me the last time Dr. Panofsky and I were talking, they were still looking for beauty, weren't they? [Laughter.]

We are still looking for truth around here, too. [Laughter.]

Dr. TRIVELPIECE. Beauty, too. Physicists have a habit of attaching what appear to be frivolous names to things in order to make them easy to understand.

I think it belies the seriousness of the subject, though.

Senator JOHNSTON. I thought that was good. It does help you remember them.

Dr. TRIVELPIECE. It is a clever way to call attention to these things that allows easy memory and, in some cases, it makes good common sense. The use of color, the analogy with regular color and how color is mixed to form light, has quite a bit of important bearing on this.

I have one more example here in the nuclear medicine applications program which is interesting. I don't believe it has been brought to the committee's attention before. That is, there is an ocular melanoma which tends to grow on the inside of the eye. It has been particularly resistive to treatment in the past and a heavy ion beam can be used to treat such a growth.

Senator JOHNSTON. Where is that, at Berkeley?

Dr. TRIVELPIECE. Yes.

Senator JOHNSTON. I have seen that.

### COMBUSTION RESEARCH FACILITY

Dr. TRIVELPIECE. The next picture is one of the facilities that has come into existence this year, the combustion research facility. It is located at Sandia Livermore. It is somewhat ironic that probably one of the first things man used was flame, but nevertheless, the understanding of the physics and chemistry of combustion is a relatively poorly understood thing. The use of lasers in order to understand the processes that take place during the 10th of a microsecond when the various combustion ingredients in flame are making their chemical transitions is important.

That will aid in understanding how engines work. Have you been to the laboratory?

Senator JOHNSTON. Yes.

Senator D'Amato. I am trying to keep one on Long Island.

### NATIONAL SYNCHROTRON LIGHT SOURCE

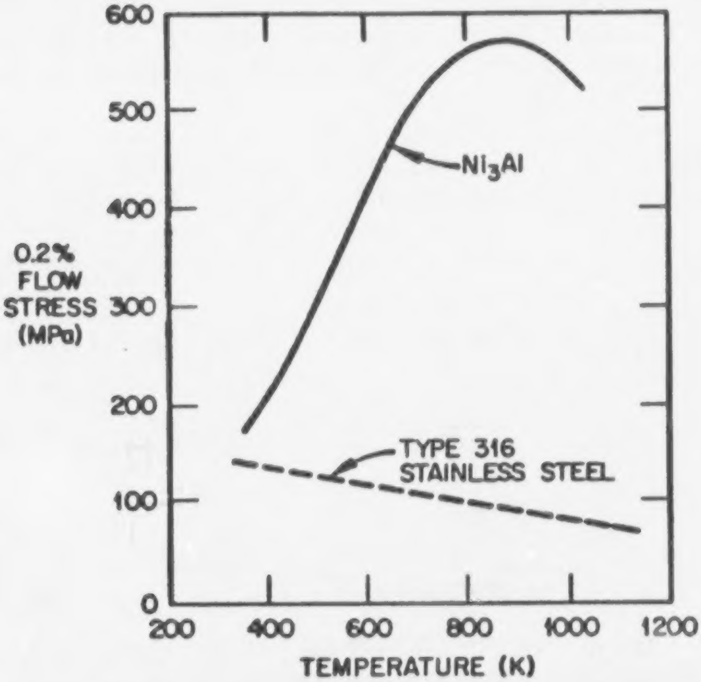
Dr. TRIVELPIECE. Well, we have one in Long Island which is the next picture up. The National Synchrotron Light Source is a facility at Brookhaven. It takes advantage of the fact that charged particles, as they go around in circular orbits, emit energy, and if you are trying to build an accelerator for high energy physics, that is a nuisance, because you have to make up that energy by supplying electricity.

There are some people who have built these facilities and maximized the ability of particles to give up their energy and put it together in such a way as to create a facility which produces very short wave length light in a very useful manner.

The picture here shows what is inside that building. This facility provides shortwave-length light that can be used for a variety of activities, one of which is photolithography. As you know, the ability to make microscopic circuits for computers and so on depends on having light sources at progressively shorter wave lengths so circuits can be etched in an appropriate manner.

This facility is used by industry, by the laboratories, and by universities in a cooperative manner that I think should be the paradigm for Government facilities that are made available on a national basis.

## THE YIELD STRENGTH OF $Ni_3Al$ INCREASES WITH TEMPERATURE AND REACHES A MAXIMUM AROUND 830 K



- BECAUSE OF THE INCREASE IN YIELD STRENGTH WITH TEMPERATURE, $Ni_3Al$ IS MUCH STRONGER THAN TYPE 316 STAINLESS STEEL AT ELEVATED TEMPERATURES.

Next is a chart which shows the strength of stainless steel as a function of temperature. The reason this is interesting is that stainless steel tends to get weaker as it gets hotter.

Of course, in all the various energy-generating technologies, it is important that you have materials that retain their strength at high temperatures, for turbines or whatever. Some recent work at Oak Ridge has demonstrated the ability to make a material which is called nickel aluminide.

As you can see from this chart, where temperatures are fairly high, it has strengths which are five or six times greater than that of stainless steel. I think it is a very promising application.

## Biological and Environmental Research

Earlier I mentioned that the Atomic Energy Commission tried to do good things with nuclear energy. They also had a defensive strategy. The defensive strategy was to learn what bad things could happen from radiation. Chemicals that are produced as a result of industry need to be characterized as to how they get from one place to another and what they do when they get there.

Radiation and chemicals can produce problems, and the biological and environmental research program seeks to understand what these are and what can be done about them.

### SAMPLE SIZES REQUIRED FOR LOW DOSE MUTATION EXPERIMENTS IN MICE

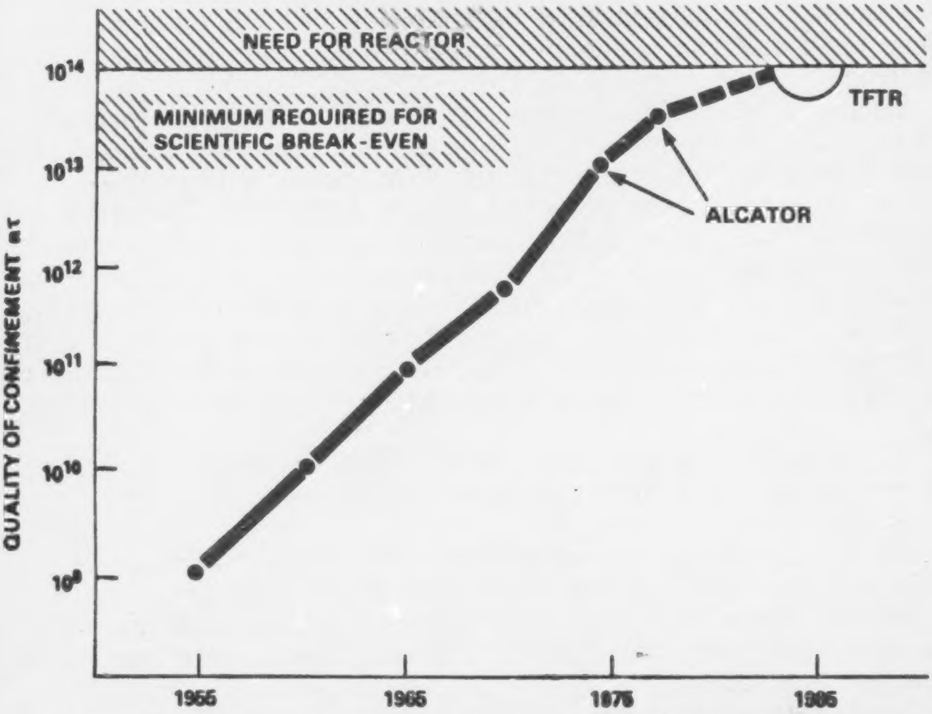
| DOSE (MR) | PERCENT INCREASE IN MUTATION FREQUENCY | SAMPLE SIZE REQUIRED |
|---|---|---|
| 500 | 0.5 | 11,780,000,000 |
| 5,000 | 5.0 | 124,240,000 |
| 100,000 | 100.0 | 816,000 |

To give you some idea of the problem, what is indicated in the next chart shows the sample sizes that are required to understand mutations. If you have only something about the dose equivalent to that which is provided by normal radiation in our environment, it takes about 11 billion mice to figure out whether or not you have caused any significant impact. In order to do this faster, more efficiently, it is possible to do research using single cells. Doing this with single cells permits you to explore what chemistry and radiation do to the cells. There is a device illustrated in the next chart showing how that can be accomplished.

## MAGNETIC FUSION ENERGY

The final item that I wanted to cover here is the magnetic fusion energy program. What is shown here is a parameter which measures the so-called quality of confinement. That is, it takes a certain amount of energy to create and hold together a plasma. You have to ask how much energy you must provide and how long you can hold it in the plasma to decide what kind of progress you are making.

**PROGRESS IN CONFINEMENT**



You can see from 1955 up until the near present, that systematic and steady progress in improving the quality of confinement has been made. The Alcator experiment at MIT has demonstrated that the confinement conditions that are needed can be produced in some sense, although not with the kind of plasma that is capable of producing fusion energy. The TFTR device, which is currently under construction at Princeton, will be completed and operating in December of this year. It will perform experiments in 1985 which will demonstrate the scientific feasibility of fusion.

The picture book has a depiction of the TFTR that is under construction now at Princeton. What you see in the illustration is the central core plasma which is confined by the magnetic field that is produced by these external current carrying conductors. The practical version of that is also shown in the picture book in its present state of construction progress.

## COMMERCIALIZATION OF FUSION ENERGY

Senator JOHNSTON. Doctor, if it all works out with Tokamak, when would you expect there to be a commercial reactor available for use in, say, 2020, 2030?

Dr. TRIVELPIECE. That is a simple question which has a complicated answer. If you mean the degree to which you have power generated that makes an economic impact on the national energy scene, I am sure that is quite a ways off in the future. I would say 2030 is probably even an optimistic estimate. However, the period of time that it is going to take to go from scientific demonstration that you can release more energy than you have invested to some-thing that will produce either bred fissile atoms or electricity, could easily be within 20 years in my opinion.

Senator JOHNSTON. Many scientists feel that if we do make that breakthrough that its principal use would be as a breeder, because its generation of electricity will be too expensive. What is your view on that?

Dr. TRIVELPIECE. I am not gifted enough in economic forecasting to determine what is going to be too expensive or not, but certainly one of the practical applications would be to produce bred fissile atoms. I also believe a viable application would be the generation of electricity. Whether or not that is done by taking the bred material and using it in light water reactors or whether it is to take the neutrons from the fusion reaction and use them to make heat, steam, and then electricity; I don't know.

That is going to depend on a collection of things which I think none of us is in position to forecast at the moment.

Senator JOHNSTON. Is that it?

Dr. TRIVELPIECE. I had some summary remarks, but I think in the interest of time, I will stop here and respond to your questions.

Senator JOHNSTON. I have a series of written questions here that Senator Hatfield had prepared, which I would appreciate if you would answer for the record.

Dr. TRIVELPIECE. Certainly.

## BENEFITS FROM MAGNETIC FUSION

Senator Johnson. They are too numerous to ask at this time. Let me just follow up on what I was suggesting. I am not suggesting we shouldn't proceed forward with fusion. I guess what I am asking is, what do you see as the benefit from it?

Dr. TRIVELPIECE. The ability to make a copious supply of neutrons through the fusion reactions is an important thing to do in an absolute sense. There are many possible applications once that particular accomplishment has occurred. Whether those neutrons should be used in making bred fissile atoms or for processing materials or creating heat, thus making steam and electricity, I think will be determined by the circumstances that exist at the time that accomplishment occurs. It is simply too valuable a thing to not have the United States in a position to have whatever consequential technologies will occur out of that kind of a neutron source available to it.

Senator JOHNSTON. Understand, I don't think there has to be a foreseeable use for everything we do. Certainly, we don't know what we would use quarks and leptons for except to expand our horizons and our knowledge, which I think is important. I think basic science is very important for the Nation to be committed to. I have been a strong supporter of that program as well as fusion, but I do think it is important for us to realize that fusion is not the great hope on the horizon. It is not going to happen, at least not while we, our children, or probably our grandchildren are around. Maybe our grandchildren.

Dr. TRIVELPIECE. I am not sure about the quarks, because if you were back in 1939 asking where it was that Dr. Lawrence's activities were going, you might not have forecast the existence of an entire nuclear industry, the life sciences, and nuclear medicine applications which grew directly out of his using that accelerator to treat a tumorous mass in his own mother which is the first such application. It is very hard to forecast.

Senator JOHNSTON. I am really talking about fusion. I think there may be some uses for it that we don't foresee right now, but generation of electricity is what I really mean in the commercial sense.

Senator JOHNSTON. Senator D'Amato.

## ISABELLE PROJECT

Senator D'AMATO. Thank you, Senator Johnston.

First of all, let me thank the chairman for giving me the opportunity to be present today. Although I am a member of the Appropriations Committee, I am not on this subcommittee. I have a statement which I would like to submit for the record that basically explains the importance, as we perceive it, of Brookhaven National Laboratory, not only for our region, but for the total scope of high-energy physics for this Nation.

Last year I think we had an appropriation of $15 million for the Isabelle project and this year I see we have none. It concerns me greatly. I strongly urge and request that a minimum of $10 million be appropriated for the construction of Isabelle during fiscal year 1983, particularly in light of the fact that the appropriation request is going up from $364.5 million in fiscal year 1982 to $429 million. First, I think it would be tragic to lose the tens of millions of dollars that have been invested in Isabelle out at Brookhaven National Laboratory. Second, the scientific community that has come together, coalesced together, has expressed strong support for the Isabelle project.

Third, the fact is that a number of the problems that were in existence have been cleared up and the project seems to be well on its way to meeting its projected goals. To simply cut off construction at this point in time on Isabelle would be a great blow to the scientific community and, in the long run, to the United States leadership in physics, and to mankind as a whole. It would be a tragedy to terminate funding for Isabelle. I think the Department's decision is ill timed and ill conceived. I recognize that there are budget constraints and, consequently, rather than ask for an appropriation of $15 million that we had last year, I think I am making a rather modest request by asking the members of this committee to approve an appropriation of $10 million so that this project can move ahead.

Again, I strongly request that $10 million be appropriated for the construction of Isabelle during fiscal year 1983, in excess of Brookhaven National Laboratory's other appropriations for high-energy physics. The allocation of $10 million, however, is needed to preserve the project's momentum and key staffing as well as to provide for modest progress and protect the Government's substantial investment. With improvements in the economy, I will press for full funding in future years to complete Isabelle in a timely and economically efficient manner.

Last year, this committee explicitly stated its strong support for continued progress on Isabelle. Despite that expression of intent, the administration proposes that no funds be appropriated for Isabelle this year and that the construction and research already done be used to support some much less capable, scaled-down accelerator which has not yet been defined.

The administration has stated that it is dedicated to a three-laboratory, high-energy physics program. They rightly point out that Stanford, Fermilab, and Brookhaven provide the required regional support for advanced scientific research and the diversity of tools and approaches to problem solving required to keep our high-energy physics program a world leader.

To make that three-laboratory program a reality, all three facilities must have the research tools they need to probe the boundaries of human knowledge. Without Isabelle, Brookhaven's program in high-energy physics will lose its attractiveness to physicists. Over time, we will fall back to a two-laboratory program.

Without Isabelle, opportunities for graduate students to do meaningful new research under the guidance of our most senior and capable scientists will be seriously decreased. Without Isabelle, we run the risk of abandoning our leadership in high-energy physics to foreign countries. Without Isabelle, we do slow, serious, and long-lasting damage to the scientific and technical communities in the Northeastern United States.

The high-energy physics community has continuously reviewed and supported the construction of this colliding beam facility. Most recently, the high-energy physics advisory panel's subpanel on long-range planning for the U.S. high-energy physics program stated that it:

> Strongly recommends that the Isabelle project be built and completed during this decade. This investment in the program will enable the United States to maintain an active and healthy high-energy physics program near the end of the decade and into the 1990's.

The major performance goals of Isabelle—namely, its high energy and high proton currents—were chosen to attain a large step in accelerator and physics capability. To reach these goals it was desirable to employ as much advanced technology as seemed prudent and feasible. In particular, this required development of high field superconducting magnets and the associated cryogenics. Although some unanticipated difficulties and accompanying delays were encountered, these technical problems have essentially been solved. The other technical components of the accelerator have progressed in an acceptable and normal fashion. The conventional construction has proceeded on schedule, on cost, and is 70 percent complete.

I wish to emphasize that Isabelle will be a unique and powerful research facility on both a national and international scale. It will enable the United States to maintain its leadership in the important field of high-energy physics for many years to come. To this end, I again quote from the recent report:

> Isabelle is the largest American high-energy facility construction project during the 1980's and represents a major new center for experimentation in the United States beginning around 1989. As a dedicated facility, it will permit a diverse, broad-based research program which can support six major experiments simultaneously. The facility is unique because of its combination of high energy and high luminosity. Isabelle has a high potential for exploratory work which could lead to discoveries in the multi-hundred million electron volt mass range. Further, the growth potential is excellent. It will complement facilities that are likely to exist in Europe at that time and also the other facilities in the U.S. program.

Historically, the United States has been at the forefront of high-energy research due to our highly developed technology and our willingness to use it for the advancement of scientific knowledge. This results not only in progress in pure science but also aids the furtherance of technological advancement through spinoffs. High-energy physics, together with the space program, provided, for example, the impetus for the development of small computers and fast microcircuitry. Other medical breakthroughs such as CAT scanning have resulted from the electronic and analysis techniques developed for high-energy particle detectors. The list goes on and on.

While industry must surely take the leadership in pursuing applied research, only the Government can provide the long-term direction and substantial funding which basic research requires. Without the breadth provided by Government involvement and without the freedom from the mission of product development, basic research will ultimately wither and die. Our future generations will be left without a firm scientific foundation upon which to build.

In order not to lose the momentum in this important project which is the cornerstone of the U.S. high-energy physics program of the late 1980's and 1990's, I strongly urge your support for increased construction funding of the Isabelle project.

## HIGH-ENERGY PHYSICS PROGRAM PLAN

Now let me ask, doctor, if you can briefly explain the Department of Energy's plan with regard to the conduct of high-energy physics research by the national laboratories. What is your overall goal?

Dr. TRIVELPIECE. We have three major laboratories. The Stanford linear accelerator creates and produces one type of high-speed projectile electrons. It permits the opportunity for electrons to be driven into targets or electrons to be impacted onto positrons, which are also created.

The Fermi National Laboratory produces heavy particles, protons, and those are accelerated into targets. The plan with Isabelle at Brookhaven is to have it provide an opportunity for protons to be collided with protons. In this case, at six locations that would be around the ring.

The circumstances in which we found ourselves in the present tight budgetary situation were that we were, as a result of increases in electricity costs and the like, faced with the difficulty of not being able to operate those facilities that we already had in place, Stanford and Fermilab at what we felt to be an appropriate level to realize a good return on the investment that had already been made in them. Correspondingly, we have provided for in our request an increase in the operating level of those devices which we think are necessary.

## PROBLEMS WITH SUPERCONDUCTING MAGNETS

There have been some problems at Brookhaven Laboratory in the design and construction of superconducting magnets that are to be used in a tunnel that has already been built there. The problems with those superconducting magnets, we felt, were paramount. We provided approximately $23 million to allow Brookhaven to solve that problem and I believe that is a very essential first step before proceeding with other aspects of the project.

I have no doubt in my mind that they can proceed with the conventional construction. They have done a good job on that. However, until they solve the magnet problem, the diversion of resources away from that activity into construction might further impede their chances of bringing this project in successfully.

So, we have tried to lay out a plan for them which allows them to solve the magnet problem in a manner that would permit us to proceed with the construction at the earliest possible stage.

At the moment, they don't have a satisfactory solution to the magnet problem. To explain further what I mean, the magnets that are required there are somewhat similar to those magnets I showed in the Fermilab tunnel.

The problem is they need to provide magnets that have a certain field strength and a certain accuracy because these particles have to go hundreds of thousands of miles in the course of their being accelerated. To be able to produce such magnets at that accuracy by using unskilled labor is an essential ingredient.

Otherwise, the costs would be absolutely prohibitive. At the moment, they are capable of producing magnets that have the field strengths, but they are using highly skilled labor. They still have yet to go through the process of demonstrating they can build them with adequate quality control, in adequate number, and within acceptable cost boundaries.

So, we have tried to provide a means to permit them to do that. I would worry about diverting funds away from solving the magnet problem into continuing conventional construction.

## IMPORTANCE OF ISABELLE

Senator D'Amato. I wouldn't have you divert funds away. I would add an additional $10 million so that construction can proceed. We must not lose our Isabelle construction team. We must not send out the wrong signals to the scientific community and lose the investment we have already made to date.

I am very much concerned about this. I know that you as a scientist understand the ripple effect closing down construction of this project would create. It would be devastating and would send out the wrong signal.

Now, in fact, from what I understand, an advisory subpanel for long-range planning for the high-energy physics program just stated recently a strong recommendation that the Isabelle project be built and completed during this decade.

Our investment in this program will enable the United States to maintain a superior high-energy physics program well into the 1990's.

The advisory subpanel goes on and says about Isabelle, that it is absolutely necessary for the United States to maintain its leadership in the important field of high-energy physics for many years to come.

I would suggest not a reallocation of the $23 million in research and development for the magnets as you suggest, but an increase of $10 million so that construction can continue.

Now, if we look at the totality of the funds authorized and appropriated in years gone by, this $10 million request is still a dramatic decrease. I think this appropriation would keep the project on an even keel so that it can continue and so that those moneys that have been invested in the past will not have been spent in vain.

I wonder, does your decision not to request any Isabelle construction funds mean we really should say that we are only going to support two national laboratories instead of three?

Are we prepared to do that? Do we want to sacrifice the three-laboratory policy for want of $10 million? I see billions of dollars a year spent in the area of energy. I strongly believe this matter is very important to our Nation. When I see some of the projects that we are engaged in, I ask, Where are our priorities if we will not appropriate the necessary funds to complete Isabelle? So I think $10 million is a rather modest investment in an area that will determine whether the United States retains leadership in a whole host of scientific endeavors in years to come. It will pay great dividends as Senator Johnston has indicated.

It is hard to quantify or qualify where these things are going to take you.

I leave it to you. I commend you for a very excellent presentation. Again, I understand that you are operating under funding constraints.

Dr. Trivelpiece. Thank you.

Senator D'Amato. We are going to see, maybe, if we can help the process by appropriating a couple more dollars. I think Isabelle is absolutely essential.

Senator Johnston. Senator Abdnor?

Senator Abdnor. No questions.

### BATTERY SYSTEMS RESEARCH

Senator Johnston. Dr. Kane, you have been around the Department a long time. Some of our favorite projects have been sort of phased out of the program. How is that battery research effort coming along?

Dr. Kane. Senator, I cannot give the exact status. I know of your previous interest. You are very interested in the aluminum system and high-temperature sodium and high-temperature lithium batteries. That part of the agency's budget, as you certainly know, is funded out of the conservation program.

The part energy research has done on this has been basic research on the membranes the separators used, but we haven't been heavily involved.

We are interested because it is very good science. My impression is that the conservation people are going to try to save as much as they can out of the fundamental work on those battery systems; in other words, not get the country out of this advanced electrochemistry, which is what this work is.

I am sure they will be phasing back parts of the storage program, battery program. I am not aware of the details.

I might point out that Dr. Trivelpiece was asked for recommendations and strongly encouraged them to keep alive the electrochemistry part of their research program.

Isn't that a fair reflection of your sentiments on that?

Dr. Trivelpiece. Yes, it is.

### DEPARTMENT OF ENERGY REORGANIZATION

Senator Johnston. Dr. Kane, you have been around awhile and have the advantage of perspective. Do you think you would be better off if you move this operation to, what, the Department of Commerce or Defense, or somewhere else?

Dr. Kane. Wherever it winds up, it is important that the people running it are convinced that the country needs it and do their best. That is what's important, rather than the organization itself.

I am convinced that there is a need for storage research in addition to fossil fuel storage, We ought to keep our eyes open for good ideas on long-range energy storage. It is personally interesting to me, I guess you knew that.

Senator Johnston. Do you have any recommendations to us on reorganization? I am not trying to get you in trouble with the administration, but I know as a scientist you will reply truthfully and candidly to the question.

So what is your truthful and candid advice? [Laughter.]

Dr. Kane. I stand by my previous statement. It is far more important that the leadership of wherever we wind up is convinced that the country needs an ongoing program on energy storage or, for that matter, a lot of aspects of energy research.

Let me stop there and say I think it has been kind of overlooked that in the parts that are left of the DOE, that the administration clearly supports, there are lots of good long-range energy work left for wherever it goes, in whatever organization.

I think it is, to repeat myself, I am sorry, for the third time, far more important that the new organization or the existing organization, if it continues, be convinced that there is an important job there and do a good scientific and technical job on it than the name of the organization it gets sent to.

Senator JOHNSTON. It doesn't matter it is being downgraded from a cabinet level to an assistant secretary level.

Dr. KANE. That is too complex; I am sorry, Senator. The old AEC for which I worked for many years was not cabinet level and yet I think we did excellent work at AEC.

Senator JOHNSTON. The old AEC had a whole lot more discretion and autonomy than anything does today. Maybe that is the reason why you were able to do it. Maybe we ought to deregulate some of the energy research.

Thank you, very much, gentlemen.

### ADDITIONAL PREPARED QUESTIONS FOR THE RECORD

I understand Senator Schmitt has some questions. We will place these in the record along with the additional subcommittee questions. If you could give those your attention.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY SENATOR HATFIELD

### Facility Operations

Question: Mr. Secretary, the funding request for High Energy Physics, facility operation, is increasing from $126 million in the current year to $157 million in 1983. Explain briefly the reasons for such a large increase in light of sizable reduction in other energy research activities.

Answer: The increase in the Facility Operations Subprogram of High Energy Physics in FY 1983 is intended to correct for the low utilization level of high energy physics facilities in recent years. The DOE, with strong urging from the High Energy Physics Advisory Panel, has decided that the low utilization levels of recent years (35-50%) are marginal for scientific productivity and cost effectiveness and must be restored to a more reasonable level. The FY 1983 request to the Congress gives high priority to improving utilization, on the average, to the 60-70% range. In addition, there are significant incremental costs in FY 1983 related to preoperating shakedown of the Energy Saver at Fermilab, the world's first superconducting accelerator. To accomplish this the overall high energy physics budget has been restored to the FY 1981 level of effort from the low FY 1982 level and allocation of funding within the total has given priority to the Facility Operations Subprogram.

High Energy Physics is a forefront program in basic physical science. It is an area of research in which the U.S. has enjoyed preeminence and world respect for many years. The DOE manages this program as a national trust and provides over 90 percent of the U.S. funding. Starting in FY 1979 an effort was made by DOE to stabilize the funding at a fixed, base level, with allowance to be made each year for inflation. This plan was deemed as a floor level to permit construction of ISABELLE simultaneous with effective utilization of three laboratory centers and to maintain U.S. world leadership in the field. The funding declined slowly but steadily through FY 1981 and then dropped sharply in FY 1982. With these funding pressures it has simply not been possible to maintain a good level of utilization of present facilities simultaneously with meeting the needs for advanced technology R&D and construction of new facilities critical for the program future. As a result, facility utilization levels have fallen, on the average, to well below 50 percent and construction of ISABELLE was substantially slowed in FY 1982.

It is our judgment that this situation could not be allowed to continue and thus the FY 1983 budget request addresses part of that problem by restoring an effective facility utilization level.

Question: Your statement mentions that the budget proposal would increase current facility utilization levels, which are below 50%, to the 60-70% range. What has been the utilization level for the past 10 years? Provide a table showing power costs and machine utilization factors for each major accelerator.

Answer: I will submit a table for the record.

Power Costs and Utilization for Major Facilities
in
High Energy Physics

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 |
| **Brookhaven National Laboratory** | | | | | | | | | | | |
| Power Consumption (Gigawatt Hrs.)...... | 130.5 | 122.2 | 121.7 | 124.6 | 122.0 | 121.8 | 118.4 | 116.4 | 104.9 | 82.5 | 115.6 |
| Power Cost (Millions $)............... | 1.45 | 2.13 | 3.25 | 3.23 | 3.42 | 3.42 | 3.45 | 5.07 | 7.02 | 4.55 | 7.40 |
| Utilization (Weeks)................... | 29 | 36 | 33 | 31 | 32 | 34 | 30 | 26 | 24 | 20 | 30 |
| **Fermi National Accelerator Laboratory** | | | | | | | | | | | |
| Power Consumption (Gigawatt Hrs.)..... | 240 | 342 | 375 | 419 | 449 | 448 | 377 | 308 | 300 | 281 | 305[1/] |
| Power Cost (Millions $)............... | 2.2 | 3.4 | 4.4 | 6.5 | 7.3 | 8.6 | 8.1 | 9.1 | 10.1 | 11.5 | 14.6 |
| Utilization (Weeks)................... | 40 | 43 | 44 | 41.5 | 42 | 39 | 34 | 28 | 23 | 21 | 36 |
| Operating Energy (GeV)................ | 300 | 300 | 300 | 400 | 400 | 400 | 400 | 350 | 350/400 | 400 | 500[1/] |
| **Stanford Linear Accelerator** | | | | | | | | | | | |
| Power Consumption (Gigawatt Hrs.)..... | 231.7 | 230.0 | 212.7 | 196.1 | 206.0 | 209.7 | 174.0 | 192.6 | 292.7[2/] | 283.0 | 303.5[3/] |
| Power Cost (Millions $)............... | 1.05 | 1.01 | 1.06 | 0.97 | 1.36 | 1.21 | 1.30 | 1.63 | 3.10 | 3.00 | 4.50[3/] |
| Utilization: | | | | | | | | | | | |
| a. Pulse Rate, Linac (%)[4/] .......... | 54 | 59 | 44 | 32 | 37 | 37 | 20 | 22 | 25 | 19 | 26 |
| b. Weeks of Operation................ | 23 | 32 | 36 | 35 | 28 | 32 | 31 | 34 | 36 | 32 | 36 |
| **Argonne National Laboratory** | | | | | | | | | | | |
| Power Consumption (Gigawatt Hrs.)...... | 159.9 | 157.3 | 138.1 | 140.5 | 162.3 | 124.3 | 152.5 | SHUTDOWN | | | |
| Power Cost (Millions $)................ | 1.70 | 1.89 | 2.21 | 2.43 | 3.19 | 3.00 | 4.00 | | | | |
| Utilization (Weeks).................... | 33 | 39 | 34 | 26 | 33 | 34 | 40 | | | | |

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[1/] FY 1983 is the year of commissioning and first operation for research of the superconducting Energy Saver accelerator, with the existing conventional accelerator being operated at 150 GeV as an injector into the Energy Saver. This is reflected by the lower number of Gigawatt Hours per week during 1983.

[2/] FY 1981 was the first year of the Positron-Electron Project (PEP) operations at SLAC.

[3/] SLAC was informed in April 1982 that 13.75 Megawatts of withdrawable WAPA electric power will be recalled permanently after summer 1982. The cost of 303.5 Gigawatt hours in FY 1983 would increase to as much as $10.5 million, and the SLAC FY 1983 utilization would be forced to a significantly lower level than indicated in the FY 1983 Request and this table.

[4/] Reduced pulse rate affects fixed target experiments and not those done with the SPEAR and PEP colliders.

Question: This large increase in facility utilization would appear to be inconsistent with the Department's recent request to reprogram and reduce facility operations in the current year by $2 million. Please explain.

Answer: The FY 1982 budget requires serious cutbacks from the FY 1981 level of effort. Further, the appropriation allocated the reduction disproportionately to the High Energy Technology Subprogram. However, the Conference Report which accompanied H.R. 4144 indicated that "should the Department's priorities reflect a different allocation at the subprogram levels the Committee on Appropriation would give prompt consideration to an appropriate reprogramming request."

The reprogramming among the subprograms in the operating budget requested in FY 1982, although resulting in an undesirable low utilization level, permits the program to meet its most essential R&D needs and represents our best judgment of the optimum program balance within the funds available.

High energy physics is a program almost totally dependent on major accelerator and colliding beam facilities employing the most advanced technologies. An effective level of advanced technology R&D is absolutely essential to assure the success of the on-going construction projects and to assure that there is a future for the program. The FY 1982 funding, as appropriated, would hold advanced technology R&D at a level substantially below that of FY 1981 at a critical time when there are major needs associated with superconducting magnet development at BNL and antiproton production and cooling at Fermilab. We regret that we have to recommend holding the FY 1982 utilization level substantially below that which is desirable but, within the funding available and in consideration of competing programmatic needs, we feel that the reprogramming we are requesting in FY 1982 is essential to provide a program with the best balance between near term research and operations and advanced technology R&D critical for the program future. It should be noted that, although the reprogramming action shifts emphasis among subprogram funding levels as appropriated by the Congress, the proposed program emphasis we are requesting is totally consistent with President Reagan's March 1981 request to the Congress.

Question: Do you believe this is sound planning or has scientific enthusiasm overcome prudent program development and good sense?

Answer: I believe that our planning is sound and consistent when you look carefully at the full scope of problems we face and the overall funding available to accomplish these goals. The three subprograms within the high energy physics program are interrelated and dependent on each other. To maintain an effective and productive near-term program, while at the same time laying the foundation for the program's future where advanced technology is essential and long lead times are involved, requires a careful balance among the three subprograms. We believe that our reprogramming action for FY 1982 and the present request for FY 1983 provide the appropriate balance and present a consistent posture for high energy physics funding. We are, of course, also enthusiastic about the recent outstanding scientific discoveries and progress of the science.

Question: What impact do large "ups and downs" in facility operations have on this type of scientific work?

Answer: An experiment in high energy physics typically takes 3 to 7 years for the design, fabrication, data accumulation and analysis. Disruptions of the schedule due to budgetary shutdowns of the accelerator can add a year or more to each endeavor. Oscillations in the level of facility operations can lead to uncertainties and inefficiencies of experimenters and laboratories in planning and performing research. University-based scientists, who comprise the major part of the researchers, require reliable advance scheduling to phase their research activities into their academic schedule. Large "ups and downs" in facility operations make it difficult to hold together the large experimental collaborations which are often composed of scientists from many institutions.

"Downs" in facility operations are reflected in reschedulings and delays in mounting and running experiments at the laboratories. This results in inefficient use of the national research facilities and long queues of researchers waiting to perform their experiments. Too short a running time during any year can require an experimenter to wait another year to complete data accumulation. The resultant lengthened time to complete experiments is highly discouraging and demoralizing to the researchers. The discouragement of graduate students and potential graduate students has a deleterious effect on the next generation of researchers, and thus on the future of the program.

"Ups" in facility operations with proper notice and preparation can greatly enhance the research productivity. The proposed "up" in facility operations at this time would allow research teams, who have been forced to wait in longer and longer queues in recent years because of decreased facility utilization, to perform important experiments more effectively.

High energy physics research needs stable and adequately supported facility operations which will allow efficient use of facilities and allow scientists to respond quickly to the challenges of new discoveries vital to understanding the laws of matter and energy.

Question: Provide for the record in 5% increments, showing both power costs and other support cost by lab and facility, how facility operations would be increased to reach the 1983 funding request.

Answer: I will submit a table for the record.

Power Costs and Utilization for Major Facilities in High Energy Physics[1]

| | | FY 1983 | | |
|---|---|---|---|---|
| | FY 1982 | FY 1982 Level in FY 1983 | Inter-mediate Scenario | Pres. Request |
| **Brookhaven National Laboratory** | | | | |
| Utilization (Weeks)................. | 20 | 20 | 25 | 30 |
| Power Consumption (Gigawatt Hrs.)... | 82.5 | 82.5 | 99.0 | 115.6 |
| Power Cost (Millions $)............. | 4.5 | 4.9 | 6.1 | 7.4 |
| Operating Cost (Millions $)......... | 24.0 | 26.2 | 29.1 | 32.0 |
| **Fermi National Accelerator Laboratory**[2] | | | | |
| Utilization (Weeks)................. | 21 | 21 | 30 | 36 |
| Power Consumption (Gigawatt Hrs.)... | 281 | 230 | 275 | 305 |
| Power Cost (Millions $)............. | 11.5 | 11.0 | 13.1 | 14.6 |
| Operating Cost (Millions $)......... | 60.5 | 67.5 | 71.0 | 74.0 |
| **Stanford Linear Accelerator Center** | | | | |
| Utilization: | | | | |
| a. Linac Pulse Rate[3]........... | 19 | 19 | 23 | 26 |
| b. Weeks of Operations............ | 32 | 32 | 34 | 36 |
| Power Consumption (Gigawatt Hrs.).. | 283.0 | 283.0[4] | 295[4] | 303.5[4] |
| Power Cost (Millions $)............ | 3.0 | 3.4(+≤4.6)[4] | 4.0(+≤5.2)[4] | 4.5(+≤6.0)[4] |
| Operating Cost (Millions $)........ | 38.5 | 42.5[4] | 45.5[4] | 48.0[4] |

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[1] The table lists three levels of operations for FY 1983. We are unable to provide meaningful details at the level of 5% increments.

[2] Note 1: FY 1983 is the first year of commissioning and operating the superconducting Energy Saver accelerator and its associated large cryogenic plant.
Note 2: Power rates are projected to increase by 19.6% in FY 1983. Other operating expenses are estimated to escalate by 9.1% in FY 1983.
Note 3: The base power consumption for the Fermilab site, including the cryogenic plant needed to hold the Energy Saver at 4.7°K will cost about $6.5M in FY 1983 (130 Gigawatt Hrs.).

[3] Reduced pulse rate affects fixed target experiments and not those done with the SPEAR and PEP colliders.

[4] SLAC was informed in April 1982 that 13.75 Megawatts of withdrawable WAPA electric power will be recalled permanently after summer 1982. The cost of 303.5 Gigawatt hours in FY 1983 would increase to as much as $10.5 million, and without additional funding the SLAC FY 1983 utilization will be forced to a significantly lower level than indicated here.

## Isabelle Project

Question: Review briefly the current status of the ISABELLE project including technical problems and the growth in the total estimated cost.

Answer: Construction of ISABELLE was initiated in FY 1978. In view of the R&D problems associated with the superconducting magnets and funding limitations on the total HEP program, construction was substantially slowed in FY 1982 and no construction funding is requested for FY 1983. The focus in FY 1983 will be an R&D effort on accelerator quality superconducting magnets and on studies of possible alternate facilities which might have lower costs.

Although the technical problems with the design of an acceptable superconducting magnet have now been mostly solved by the adoption of the two layer cable design, substantial R&D is required to proceed from these successful R&D magnets to an engineered production prototype magnet and to develop and demonstrate a cost effective fabrication capability.

The total estimated cost has increased beyond the $275 million projected in 1978 due in part to delays and extra costs related to the technical problems associated with the magnets and in part to inflation factors.

The total estimated cost resulting from the October 1981 rebaselining review, which assumed FY 1983 construction funding was $465M. Of the $190M increase in the total estimated cost $150M was due to inflationary impact, in part caused by project stretchout and in part to low (6-7%) inflation factors used in making the 1978 estimate.

Question: What actions have been taken to improve project management and thereby hold future cost increase to a minimum?

Answer: BNL has appointed a new Deputy Project Director and a new Magnet Division head and they have underway an aggressive search for a full-time qualified Project Director. The Project has been reorganized to clarify lines of authority and responsibility. A computerized management control system has been put into operation. A schedule of regular monthly project reviews has been instituted to provide ongoing and detailed oversight of the project.

It also should be noted here that a major goal of the planned R&D activities at BNL in FY 1982 and FY 1983 is to try to reduce future costs of a new facility at Brookhaven. In the process of developing the magnet production techniques and facilities, much of the effort will be directed to developing and incorporating cost saving design modifications to the maximum extent possible. Also studies are being pursued on the other technical systems of the machine for design changes which would reduce costs. In a parallel effort, BNL is examining alternate magnet designs and alternate machine configurations which might lead to a lower cost facility.

Question: Briefly, what is the nature of the problems encountered with the superconducting magnets?

Answer: The previous BNL superconducting magnet design using braid conductor and a non-split magnet yoke failed to meet critical performance standards in the areas of peak magnetic field, ability to achieve the design ramp rate, magnetic field quality and training to get to peak field. Training is an undesirable characteristic of certain types of superconducting magnets whereby the highest magnetic field can only be reached slowly after continued operation. These problems are believed to have been largely related to deficiencies in the braided superconductor and the inability to achieve adequate clamping of the magnet coil with the original non-split yoke design.

Question: What progress has been made in solving the technical and engineering problems? Have all technical criteria been met and resolved? Are the economics of producing the magnets favorable?

Answer: BNL has made substantial progress toward solving the technical and engineering problems associated with the magnets. The initial R&D models of the new two layer cable magnet design have all exceeded the required peak field, have been free of the training problems and have substantially exceeded the ramp rate requirements. The previous braid magnet design had serious problems in all three areas. Although further R&D is needed to demonstrate field quality, there is high confidence that this magnet design will successfully meet the required performance standards. Substantial R&D remains to develop and demonstrate procedures, tooling and techniques to fabricate these magnets in a reliable, reproducible and cost effective manner. It is believed that the magnets can be produced at a cost consistent with the October 1981 project cost estimate.

Question: Why is no ~~construction~~ funding included in the 1983 Budget to continue construction?

Answer: No construction funding for ISABELLE is requested in FY 1983. The focus in FY 1983 will be on an R&D effort for superconducting magnets and on studies of alternates which might have lower costs. Although the technical problems with the design of an acceptable superconducting magnet have now been apparently solved by the adoption of the two-layer cable design, substantial R&D is required to proceed from these successful R&D magnets to a fully engineered production prototype magnet and to develop and demonstrate a cost-effective fabrication capability. A decision to proceed with future facility development will be based on overall high energy physics program requirements and budget considerations.

Question: Could construction funds be used in an efficient and productive way in your professional opinion?

Answer: We feel that, within the funding available to the high energy physics program, the highest priority has to be given to funding the R&D needed to solve the problems with the superconducting magnet design, to develop and demonstrate cost-effective fabrication techniques, and on studies of alternatives which might have lower costs. A decision to proceed with future facility development will be based on this R&D and on overall high energy physics program requirements and budget considerations. Before making this decision, appropriation of new construction funds would be premature.

Question: As a scientist who has worked in the research area for many years, do you think it would be wise or prudent, based on recent progress, to provide construction dollars in 1983 to advance the Isabelle project?

Answer: Although BNL has made excellent progress in establishing a new magnet design, there still remains R&D to establish that this promising new design meets all design criteria and to develop and demonstrate the tooling and techniques for fabricating the magnets in a reliable, reproducible and cost-effective manner. I believe that it is most important in FY 1983 for BNL to focus attention on these R&D problems.

Question: Would it be correct to say that a pause in construction at this time will save much more in the future years than it would cost due to inflationary impact?

Answer: The pause in ISABELLE construction is due to technical as well as economic factors. If the ISABELLE project is ultimately constructed according to the original design, a pause in construction at this time is not expected to result in savings to offset the anticipated inflation. On the other hand, BNL has R&D underway during this interim period which may result in a revised machine design or other cost savings which could approach or surpass the additional inflation incurred by the delay.

Question: Do you expect the construction costs to increase, if so how much?

Answer: Except for inflationary impact, we do not anticipate any increase in cost above the estimate I gave earlier based on the October 1981 rebaseline of the project. It is hoped that the planned R&D effort and studies of reduced cost facilities proposed in FY 1983 will allow a reduction in construction cost.

Question: Are the funds budgeted in FY 1983 for superconducting magnet R&D at BNL sufficient to preserve key project staff?

Answer: The $23 million requested for superconducting magnet R&D at BNL in FY 1983 should be, by judicious reassignments within the ISABELLE effort and elsewhere within BNL, sufficient to retain most key project staff.

### University Research Support Funding

**Question: What portion of the high energy and nuclear physics budget for 1983 goes to support university research and how does this compare to the 1981 and 1982 levels.**

**Answer: In the FY 1983 budget for high energy and nuclear physics, 19.1 percent of operating funds is for support of university research. Comparable figures for FY 1981 and FY 1982 are 19.2 and 20.4 percent, respectively. It should also be noted that a large fraction of the funding allocated to the laboratories for operating and equipment actually supports university users. In high energy physics nearly 80 percent of the beam time at the national accelerator centers is used by university-based scientists. A similar situation exists with the large national nuclear research facilities. At the Clinton P. Anderson Meson Physics Facility, 65 percent of total beam time is provided to university users; at Lawrence Berkeley Laboratory Bevalac, 40 percent; at the William H. Bates Electron Linear Accelerator, 80 percent; and at the Holifield Heavy Ion Research Facility, 45 percent.**

### Inflation Assumption

**Question: What inflation factor was used in developing the 1983 request for High Energy Physics facility operations and other support activities?**

**Answer: An inflation factor of 10 percent was used. This was based on the output of the on-going Analysis of Cost and Price Changes for High Energy Physics. This widely respected analysis incorporates direct input data from the laboratories and direct on-line computer input on broad economic indices from several well-known economic forecasters into a model for forecasting inflation factors for the high energy physics program. This inflation factor of 10 percent does not take into consideration special power cost problems which have a major impact on the program.**

### Nuclear Medicine Applications

Question: Could you discuss, in both human and economic terms, the benefits that have come out of the Nuclear Medicine program?

Answer: The Federal Government should be proud of its sponsorship of the Nuclear Medicine Research program carried out by the Department of Energy (DOE) and its predecessors. First, where the program begins and ends should be understood. Largely in the DOE National Laboratories and partially in universities, physicists and chemists develop basic science information which is advanced further by engineers and biological scientists. At this point the Nuclear Medicine Research program develops isotopes (radioactive and stable), radiopharmaceuticals and instrumentation. Cellular, animal and human feasibility is validated. At that level, the new technologies are either turned over to private industry or specific disease relationships are evaluated by another agency such as the National Institutes of Health. A relatively small amount of specific cancer treatment is done at certain National Laboratories because of their unique facilities.

Most of the human benefits are derived from improving and streamlining the diagnostic and/or the treatment process thereby reducing patient suffering and total care expense. A diagnostic example is the increasingly popular use of Thallium$^{201}$ for cardiac imaging. This painless and safe procedure is useful in evaluation of blood flow in heart muscle. If the study is negative, and many are, the next procedure, coronary arteriography becomes unnecessary. Although this latter procedure has some danger and lots of discomfort and expense, it is needed in planning specific coronary artery surgery.

A therapeutic example is the 68,000 people who have had their thyroid cancers cured by simply drinking their dose of Iodine$^{131}$. Long-term studies have proven the safety of this procedure. Compare it with the alternative--radical neck surgery--involving added suffering, disability, danger and expense.

Finally, a radionuclide which is used in approximately 12 million imaging procedures annually, Technetium-99m, has become the primary agent for imaging the brain, liver, lungs, spleen, kidney, bone marrow, skeleton and blood pools. Technetium-99m is now routinely produced by industry with a volume of sales totaling $100 million per year. The full potential of Technetium-99m-labeled agents has yet to be realized. A number of research projects are being supported to explore the basic chemistry of Technetium and its use in further imaging studies of tumors, the heart, and the biliary system.

Financial returns from the Nuclear Medicine Program may be appreciated by examining the following tabulated information:

Data[1] (1978 Dollars) assembled from "An Economic Study of the Radionuclides Industry," Centaur Associates, J. Birdsong, NUREG/CR-2048, July 1981, p.95.

| YEAR[2] | SALES ($ Millions) | EMPLOYMENT (1,000) | WAGES & SALARIES ($ Millions) | ANNUAL CAPITAL Expenditures ($ Millions) |
|---|---|---|---|---|
| 1967 | 1,850 | 56.9 | 880 | 120.7 |
| 1973 | 3,030 | 86.5 | 1,350 | 204.5 |
| 1975 | 3,540 | 98.2 | 1,540 | 236.9 |
| 1977 | 4,270 | 115.8 | 1,820 | 290.6 |
| 1978 | 4,550 | 123.3 | 1,940 | 306.5 |

[1] Compiled from estimated economic activity of (A) Medical Accelerator Users, (B) Medical Suppliers (C) Medical Research, and (D) Medical Diagnosis and Therapy. Not included because inseparable from non-medical are radionuclide imports and exports, personnel safety goods and equipment for handling radionuclides.

[2] 1969 & 1971 also available were not included because they did not add enough to the picture.

10 or 15% of above amounts could easily come back to the Federal Government in taxes - a substantial increase over research dollars spent (see below).

Budget for Nuclear Medicine Application

| FY | ($ Thousands) |
|---|---|
| 75 | $14,215 |
| 77 | 14,599 |
| 78 | 15,059 |
| 79 | 14,051 |
| 81 | 17,440 |
| 82 | 18,986 |
| 83 | 18,500 |

## Basic Energy Sciences

Question: Each operating expense account under Basic Energy Sciences shows a sizable increase over the current funding level. Explain briefly why it is necessary to provide such increases during this time of budget stringencies?

Answer: New responsibility for the Stanford Synchrotron Radiation Laboratory (SSRL), transferred from the National Science Foundation to Basic Energy Sciences in FY 1983, required $6.8 million of the FY 1983 increase to operate the facility. Research using the SSRL will continue to be funded by the Department of Defense, the National Institutes of Health, the National Science Foundation and other sources including the Department of Energy. No FY 1982 comparability is shown in the FY 1982 budget column. Thus the budget increase for the Department of Energy programs is, in reality, $32.7 million, or 13%. Of the 13% increase, 2% is needed to meet increased operating costs of the High Flux Beam Reactor, the High Flux Isotope Reactor and the Combustion Research Facility; 3% to meet major new facility operation and synchrotron radiation research needs, 1% for construction, 3% for planned increases in the newer subprograms and the remaining 4%, less the anticipated inflation, is to partially offset cost of living increases in the remaining parts of the program. Some existing activities will have to be phased out in order to meet the identified higher priorities listed above.

The 13% increase ($32.7 million) is comprised of 5 parts:

First is $5.2 million for increased operation costs of the Combustion Research Facility at Sandia/Livermore, and for increased costs to BES for the operation of the Brookhaven High Flux Beam Reactor and Oak Ridge High Flux Isotope Reactor. This $5.2 million consists of 2 parts: $1.2 million is for the centralization of ER support of the two reactors to serve all ER needs for which no comparability is shown in the FY 1982 columns of the BES budget, and $4 million is the increased cost to support all three of these facilities.

Second is $7.8 million for staff and operating support to permit new facilities to serve the critical research needs for which they were built. Construction of the National Synchrotron Light Source is complete and there is now a requirement for funds to operate the machine. There are concurrent increases needed to permit research projects to be implemented at the newer facilities as well. The increases required are primarily to equip and implement effective operation and use of this new facility.

Third is an increase of $2.7 million for construction to increase the performance capability of the Los Alamos Scientific Laboratory Weapons Neutron Research Facility. The timing of this request is critical since the work must be done concurrent with a Defense Program construction project currently underway. The modification sought will allow a significant and cost effective improvement in our national capability for advanced neutron research, well beyond that which meets current Defense Programs needs. The neutron research BES is supporting here is research wherein the neutron is used as a probe to study very basic properties of matter such as magnetic structures or hydrogen embrittlement of metals.

Fourth is an increase of $7.9 million for the Engineering, Mathematical and Geosciences subprogram, Advanced Energy Projects subprogram and Biological Energy Research subprogram in line with longstanding requirements to strengthen the Department of Energy's basic research in these newer areas. Each of these subprograms is relatively new to BES and in our estimation is subcritical in size - small compared to the potential contributions of each to the Nation's energy future.

Fifth is an increase of $9.1 million to partially offset cost of living increases in the core research program at universities and the National Laboratories which, as a result of the combination of cost of living and the heavy impact of the new facilities responsibilities, will be reduced in order to accommodate the high priority needs that I have just discussed.

Question: What inflation rate was assumed in developing the request for each program account and what is the budget real increase over current levels?

Answer: As discussed in the previous answer, when you take into account the transfer of responsibility for SSRL, the increased operating costs for facility operations, new synchrotron radiation research, and modest increases in the newer subprograms, the remaining increase is less than 4%. This 4% increase is less than the most optimistic projections for inflation. As a result we are projecting a real decrease in some of the Basic Energy Sciences core research.

Question: What portion of the budget request, by program, is for the direct or indirect support of university programs and projects?

Answer: BES provides both direct and indirect support for university programs and projects. Direct support is provided by the funding of individual projects using the peer review evaluation process as follows:

| | Operating Expenses | | |
|---|---|---|---|
| | Total Request | University Funding | Percent of Request |
| Nuclear Sciences | 30,644 | 7,924 | 26 |
| Materials Sciences | 108,700 | 23,649 | 21 |
| Chemical Sciences | 70,000 | 19,907 | 28 |
| Engineering, Mathematical & Geosciences | 31,050 | 14,705 | 47 |
| Advanced Energy Projects | 8,300 | 2,824 | 34 |
| Biological Energy Research | 9,500 | 6,691 | 70 |
| Program Direction | 3,100 | ---- | -- |
| Total BES | 261,294 | 75,700 | 29 |

Additionally, the research sponsored at the Lawrence Berkeley Laboratory at the University of California and the Ames Laboratory at Iowa State University is conducted primarily by faculty with teaching responsibilities and graduate students. Approximately 11% of BES funds in FY 1983 will be used to support research at these two laboratories.

Indirect support of university programs and research is less quantifiable but equally critically important to the university community. Most DOE laboratories provide the means and opportunities for university faculty members and graduate students (estimated to be 20% of full time equivalent staff) to work at the laboratories for extended periods of time in a collaborative mode. Additionally major research facilities such as our electron microscopes, the Combustion Research Facility, neutron spectrometers, and the NSLS are made available to the university research community for meritorious research. For example, it is estimated that approximately 40% of the use of the National Synchrotron Light Source at Brookhaven will be by university staff. This estimate is based on the current mix of research teams participating in beam line development at the facility.

The totality of this indirect support is not easy to quantify. However, exclusive of high energy and nuclear physics, it constitutes a major contribution to university based advanced research that is dependant upon expensive research facilities and instrumentation.

Question: Why is the Synchrotron Radiation Laboratory, which is currently funded by the National Science Foundation, being transferred to your budget?

Answer: At the recommendation of OMB the responsibility for the SSRL operational costs will be assigned to BES in FY 1983. This will give BES the responsibility for the support of the two major synchrotron radiation research facilities in the U.S. - the SSRL and the soon to be completed National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory. For budgetary purposes, the operational costs for SSRL are included ($6,344,000 operating, $456,000 equipment) under the Nuclear Science line of the BES program FY 1983 budget submission. The operational costs for NSLS which are included within the Chemical Sciences and Materials Sciences lines total $12,200,000 ($9,400,000 operating, $2,800,000 equipment).

The transfer of SSRL operational responsibility accomplishes two purposes: first, it meets the Administration's goal of improved management of national user facilities by assigning both SSRL and NSLS to the Office of Basic Energy Sciences; second, it facilitates budget and fiscal management at SSRL that is tied to the Stanford Positron Electron Asymetric Ring (SPEAR) at Stanford, a facility supported under BES' sister program, High Energy and Nuclear Physics (HENP). Both HENP and BES are in the Office of Energy Research. About 40% of the cost of operation of SSRL is being budgeted by BES for reimbursing the HENP project for operation of SPEAR for the dedicated production of synchrotron light radiation used at SSRL.

In summary, the transfer of SSRL to BES is highly appropriate. It improves overall management of the facility within the Stanford complex, and will result in SSRL being treated from the management point of view as a major user facility administered under our Nuclear Science program. From a budget point of view, it will be teated as a BES responsibility similarly as our other facilities. Programmatically, it will be viewed as a major BES facility along with the NSLS to serve the field of synchrotron light radiation research.

## Magnetic Fusion Program

Question: Mr. Secretary, the Magnetic Fusion budget for fiscal 1983 of $444 million, which is $10 million below the 1982 level, appears to be a shift in the emphasis on this important energy source. Would you care to comment? For example, in actual terms, there will be a reduction of effort in Applied Plasma Physics and about the current level of effort in Development and Technology.

Answer: There are actually two shifts of emphasis involved at the same time. First, with respect to the science and engineering balance, we have had to delay making the planned shift in emphasis to the enhanced engineering phase; this delay was brought about by the need to constrain federal expenditures. This same budget constraint led us to shift the balance between construction and research efforts by continuing the emphasis on research and reducing the efforts on construction.

Even though we have delayed the integration of engineering technologies in a fusion power demonstration which would establish the engineering feasibility of fusion, this budget does represent a continuing advance of our capabilities and understanding of basic fusion technology as well as basic fusion science.

Question: In addition, I believe the budget proposes to change the program direction and emphasis related to the Fusion Materials Irradiation Test Facility (FMIT), Fusion Engineering Device (FED), and the Center for Magnetic Fusion Energy (CMFE). In your view, does the budget sustain the progress and advances of the past few years in a meaningful way?

Answer: Yes, with the exceptions of FMIT in the engineering area and EBT-P in the research area, I believe the budget does sustain the progress and advance of the past few years in a meaningful way, although not at the pace envisioned earlier. In the case of FMIT, we are proceeding in concert with Congressional support and direction to seek international participation to continue this project with a minimum of delay. In the case of EBT-P, we are studying its position in the FY 1984 budget development process.

Question: What effect or impact will these changes have on the progress and momentum of the fusion R&D program?

Answer: Delays in operation of FMIT and EBT-P result in both delays in acquiring the facilities with their knowledge outputs and increases in costs from escalation, level of effort and restart costs. Depending upon the magnitude of these delays, determined more by the funding level supportable in FY 1984 than by the FY 1983 level, the consequences can range from an acceptable reduction in benefit/cost ratio to a rethinking of the objectives of the effort and the best means of satisfying the underlying need. Delays in initiating the FED will be used profitably to look for qualitative improvements to the baseline design in both performance and cost. Although these slowdowns will certainly reduce the momentum in the specific areas affected, the net impact on the program can be as much determined by the potentially positive outcome of rethinking the program strategy and refocusing program activities as by the negative aspects of project delays.

Question: What impact will the budget request have on fusion energy being available early in the next century?

Answer: Because of the complex, evolving nature of fusion R&D, it is not possible to predict accurately the impact of the current budget decision on the availability of fusion in the next century. Although the impact could be simply a straightforward delay of the order of one or a few years or an increased program risk from delays in exploiting developing ideas, it is more likely with active management that because of the continuing developments in the program the delayed next steps will be more confidently based and designed for higher performance and increased cost effectiveness. In the latter case, it is possible that a later, but more focused engineering program could result in a minimum of delay compared to earlier expectations.

Question: Does the budget request provide the resources, both dollars and people, needed to maintain the program pace and research goals at levels envisioned by the Administration's revised budget for the current fiscal year?

Answer: With the obvious exception of the FMIT project and the accelerations anticipated for both the EBT-P and MFTF-B projects and the FED preparations, the budget was prepared on the general basis of maintaining the program pace and research goals associated with the fusion energy program in this fiscal year.

Question: Many people keep talking about the urgency of proceeding with an accelerated - crash program - to develop fusion energy. What are your thoughts regarding the need for a "crash program" in fusion energy development?

Answer: I understand the concept of a "crash program" in the context of developing a practical product in a finite time period of a few years to a decade. In fusion, the time period to the initial availability, i.e., the time of the industrial decision on fusion's commercialization is about two decades, and the engineering and economic feasibilities are not yet demonstrated. I say this recognizing that the knowledge of fusion's potential characteristics would be of great value to the energy future of the Nation and the world and could be available in the next decade as we begin fusion reactor development. But my judgment is that a "crash program" is not appropriate now given the long time to practical outcome, the presently undefined fusion product, i.e., the reactor concept embodiment, the need to constrain Federal expenditures and the high leverage of eventual fusion reactor performance on continuing a focused R&D program.

Question: In your view is the budget request 1) at about the proper level 2) higher than needed for reasonable development 3) lower than is needed to sustain sound program for developing fusion energy?

Answer: The FY 1983 budget has been judged to be the minimum funding level required to carry out a meaningful scientific program without terminating options prematurely. The budget allows research to be pursued in a logical and efficient manner in order to provide a sufficient data base of information to be generated to allow the development of fusion technology to move forward with a minimum amount of risk in the future. Reductions below the levels requested would introduce an unnecessarily large amount of risk in proceeding toward the achievement of the program's goal.

Question: On page 31 you say, "We can now predict with confidence that net energy producing systems are possible . . ." What recent experimental results support this increased confidence?

Answer: In the intermediate plasma pressure experiments on PDX and Doublet-III, we have obtained energy confinement similar to that obtained in earlier low pressure experiments on PLT and consistent with the confinement assumed in the reactor scaling studies.

Question: Has scientific feasibility been proven on each of the three reactor conditions?

Answer: The density, temperature and energy containment demonstrated separately scale to scientific feasibility. Moreover, and more importantly, the energy containment achieved on the PLT at high temperature scales, in a larger device, to the combination of density, temperature, and confinement required for net energy production.

Question: Isn't there an inconsistency between this statement and the FY 1983 budget request?

Answer: No, because we are still seeking the best practical systems from which industry can judge the commercial potential of producing energy by the fusion process. A core scientific program must be preserved. This core program has brought us, in a space of less than ten years, from speculation about scientific feasibility of fusion to the point where we believe fusion is scientifically feasible and will attempt its demonstration soon in the TFTR facility. However, we are by no means finished with scientific tasks. A reduction in this core program would raise the risk that we would go on to develop a well-engineered, but socially unacceptable (e.g., potentially high costs and large plant size), fusion power plant.

## Administration Policy on Engineering Effort

Question: Could you tell the committee what the position and policy is on beginning the engineering effort connected with the fusion program? In layman terms, what was the basis of this decision? Is there sufficient understanding of the problems to commit significant resources to engineering activities?

Answer: The Department's position on fusion is that the program is technically ready to proceed to the enhancement of the engineering activities. In fact, the National Energy Policy Plan III states that "This Administration recognizes its responsibility to demonstrate the scientific and engineering feasibility of fusion".

The engineering component of the fusion program began in earnest in 1968 with the first reactor studies. By 1978, the Ad Hoc Experts' Group recommended and the Department accepted the view that increasing the engineering research base was equally important with the science base. By 1980, following seven years of building, using and learning from a broad set of new experimental devices, the ERAB fusion panel judged and the Department concurred that fusion was technically ready to proceed with the engineering phase of fusion R&D. This finding was based on the judgment that fusion's scientific feasibility was in a sense accepted and was about to be demonstrated in the near future and therefore, that making additional investments in fusion to begin serious exploration of the engineering questions was a sound decision.

The judgment of the fusion program management and senior Departmental officials as well as the external review groups was that there was sufficient understanding of the scientific problems to begin a stepwise commitment to the exploration of fusion's engineering issues. This commitment was to be made in addition to the scientific program whose continued output was necessary data for the design process of any large-scale fusion engineering facility.

Question: How does this budget request relate to the recently completed review by the Energy Research Advisory Board of Federal energy R&D activities?

Answer: The recent ERAB review of Federal Energy R&D activities is generally in agreement with the judgment underlying the budget request that fusion is technically ready to proceed with enhanced engineering activities. Federal budget constraints require a delay in the engineering enhancement.

Question: As a scientist and the person responsible for managing the fusion R&D effort, what are your views regarding the initiation of a significant engineering effort?

Answer: I support fully the judgments of the review groups and the Department's position that fusion is technically ready to begin the engineering enhancement and that the pace of this enhancement is directly related to funding availability.

Question: How does the ongoing work at the Doublet-III, the tokamak test reactor, and other devices relate to the decision? Is it prudent to proceed with the Fusion Engineering Device prior to gaining experience and data from Doublet-III and TFTR?

Answer: The tokamak test reactor (TFTR) will demonstrate actual net energy production and the Doublet-III, with a new vacuum vessel, will be used to test components for the net energy producing reactor; and, therefore, although they will be necessary supporting elements, data from these devices is not required to make the decision to proceed. In fact, if the decision to proceed were made, assuming realistic funding profiles, data from these devices would feed directly into the design of the engineering device.

Question: On page 34 of your statement you say, "The activities in FY 1982 and plans for FY 1983 emphasize scientific rather than engineering activities largely as a result of the need to reduce Government expenditures." Are there sound scientific and technical reasons that support this decision? Please explain.

Answer: The overall level of activities being conducted in FY 1982 and planned for FY 1983 was determined as a result of judgments of National need, technical readiness and program effectiveness tempered by the overriding concern to reduce Government expenditures. Once the level was chosen, the emphasis was deliberately maintained on scientific activities for two basic technical reasons: First, the fusion science program is not finished and remains the critical, determining element in the program; in the enhanced engineering program proposed earlier, the science program was the base to which enhanced engineering activities were added. Second, faced with a multi-year delay in the start of the Fusion Engineering Device (FED), we expect that near-term scientific efforts coupled with the modest FED design work being supported can result in qualitative improvements to the FED's technical and cost performance.

## Toroidal Confinement Systems

Question: The budget proposed a large increase for Toroidal Confinement Systems. Considering the big increase for the current fiscal year, explain why it is necessary to provide another large increase in 1983. What is the reason for budgeting $33 million for TFTR operations and diagnostics work under this item and not under the Tokamak Fusion Test Reactor item for which $69 million is requested?

Answer: The increases in the toroidal confinement systems budget from FY 1981 to FY 1982 and from FY 1982 to FY 1983 represent in large measure the transition of the TFTR program from construction to operating activity. The $33 million increase from FY 1982 to FY 1983 for TFTR is required in support of operation of TFTR which starts in FY 1983. There is a corresponding decrease in construction funds of $40.1 million appearing in the Planning and Projects activity. Although the $33 million increase in FY 1983, is described for clarity in the general discussion under the Toroidal Confinement System entry in the budget document, these activities are contained wholly within the TFTR item whose total operating funding is $69 million.

## Elmo Bumpy Torus (EBT-P), Fusion Materials Irradiation Test Facility (FMIT), Mirror Fusion Test Facility (MFTF-B)

Question: The budget request for 1983 proposes to eliminate the Elmo Bumpy Torus proof-of-principle project and Fusion Materials Irradiation Test facility, and to reduce, below planned levels, funding for the Mirror Fusion Test Facility-B project. Setting aside budgetary considerations, is this an appropriate action based upon technical reasons? Please provide an explanation for each project.

Answer: These project budget reductions were determined solely on the basis of readjusting the balance of construction and research activities in a time of severe budget constraint. Although there were no technical reasons upon which the budget actions were initiated, the final program outcome does represent the best balance that can be achieved within this total budget level.

Question: What is the near-term impact of this course of action?

Answer: The near-term impact of these project funding reductions is to delay the completion dates of each of the projects, to change work plans for next year, to withhold authorization for long-lead construction and procurement activities and finally to increase the total project costs because of additional escalation, disruption costs, level of effort activities and restart costs. In particular, the MFTF-B project is delayed about nine months, depending upon future funding levels. The EBT-P project staff is not growing and focusing on essential design and R&D issues with decisions on the project's future tied to outyear budget planning. The FMIT project is being readied for a hiatus period with a reduction in staff in FY 1983 while international support is being discussed.

## QUESTIONS SUBMITTED BY SENATOR SCHMITT

### Magnetic Fusion

Question: The Department's budget justification notes the excellent progress achieved recently in applied plasma and advanced fusion concepts. Will continued advancements in the reverse field concept with the ZT-40 be possible without additional funds for the ZT-40 upgrade, a motor generator and additional program increases.

Answer: The ZT-40M device which began operation in February 1981, has met or exceeded its design goals in terms of experimental duration, plasma temperature achieved, and plasma equilibrium and stability with a fraction of its design toroidal current. A number of urgent and important confinement issues remain to be studied: operations at full plasma current, i.e., 600 kA, measurement of ion thermal conductivity, scaling of thermal transport with magnetic field, reductions of magnetic field perturbation, reduction of impurities, steady state current drive, and control of plasma edge effects by mechanical limiters. We project that thorough examination of these issues could take another four years of operation with ZT-40M, i.e., 1986. In judgment, further data from experiments on the ZT-40M device need to be gathered and analyzed prior to making a commitment to proceed with the ZT-40 upgrade project and motor generator sets. It is our current plan to complete an assessment of this project and make a determination as to whether to proceed during the formulation of the FY 1984 Budget process. During the interim, we expect important and unique advancement of this concept from results on the present device, ZT-40M.

### Nuclear Physics

Question: An additional $5 million in operating funds for the LAMPF facility would allow an increase of 16 additional weeks of operation, from the 14 presently budgeted. What could we expect in terms of productivity with this modest increase?

Answer: Because the Clinton P. Anderson Meson Physics Facility (LAMPF) provides beams simultaneously to 10 to 12 experiments, even a small increase in accelerator operations time yields a greatly magnified increase in scientific research output. This 10 to 12 amplification factor is a very important and unique feature of the LAMPF facility. We believe the funds budgeted for LAMPF are adequate in view of the balance within the nuclear physics program in light of overall budgetary considerations.

## ENVIRONMENTAL PROTECTION AND HEALTH

## STATEMENT OF WILLIAM A. VAUGHAN, ASSISTANT SECRETARY FOR ENVIRONMENTAL PROTECTION, SAFETY, AND EMERGENCY PREPAREDNESS

## ACCOMPANIED BY ROBERT W. DAVIES, DEPUTY ASSISTANT SECRETARY FOR ENVIRONMENT, SAFETY, AND HEALTH

### OPENING REMARKS

Senator JOHNSTON. Next, we turn to William A. Vaughan, Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness.

Mr. Vaughan, I think this is also your first visit before the subcommittee. We welcome you here.

Mr. VAUGHAN. Thank you, Mr. Chairman.

I am pleased to be here today to discuss with you the Department's environment, safety, and health program. With me to assist in responding to your questions is Mr. Robert W. Davies, Deputy Assistant Secretary for Environment, Safety, and Health. And in the next few moments, I will try to summarize the much more detailed statement that I filed with you for the record.

Senator JOHNSTON. I see, by the way, you are a Washington and Lee graduate. That is my alma mater.

Mr. VAUGHAN. Yes, sir.

The goal, sir, of the environment, safety, and health program is to assure that the Department complies with all current and anticipated environment, safety, and health statutes, regulations, and requirements and that it conducts its operations with a high quality of performance with respect to all of those considerations.

This program is carried out by two major components; namely, safety programs and environmental programs.

### SAFETY PROGRAMS

The safety programs component is comprised of three offices—the Offices of Nuclear Safety, Quality Assurance, and Standards and Operational Safety.

These Offices are responsible for developing nuclear and nonnuclear safety and health policies and standards, assuring their implementation by conducting technical reviews, performing comprehensive appraisals, and by sponsoring special generic technical studies to provide guidance to the Department's technology programs and field offices.

### RELATION TO NRC

Senator JOHNSTON. Let me interrupt you and ask, What do you do that NRC does not do and why it is necessary to have a separate program?

Mr. VAUGHAN. We, for the Department and its operation, Senator, in effect, are the NRC or its equivalent. The Department, having in its nuclear operations come from the old AEC, was exempt from the regulatory aspect and my job is to provide for the Secretary that same type of independent review over the nuclear and nonnuclear activities. So with respect to the Department in this area, I am the regulator, so to speak, with respect to nuclear safety, EPA or environmental concerns, and OSHA concerns, and that applies to the operations of the Department and the operations of its contractors which, as you know, are operated in Government-owned, contractor-operated facilities so called GOCO's.

We provide, as I was saying, an emergency response capability for accidents involving actual or potential releases of radioactive material to the environment from the Department's nuclear facilities or, for that matter, from any other source, either public or private.

### ENVIRONMENTAL PROGRAMS

The Environmental programs component consists of two Offices—the Environmental Analysis and Environmental Compliance—which are responsible for environmental policy development, energy-related environmental issues and analyses, and insuring that the Department's programs and projects fully comply with the National Environmental Policy Act and other applicable environmental requirements.

### BUDGET REQUEST

The President's fiscal 1983 budget request for the environment, safety, and health program is based on the transfer of this program to an Energy Research and Technology Administration under the Commerce Department. While the overall fiscal 1983 budget request of $38.995 million is reduced from the fiscal 1982 appropriation, the principal activity of assuring safety and health at operating facilities and environmental compliance for applicable projects will continue. In fact, there will be an increased emphasis to improve the overall safety of Department nuclear facilities.

This emphasis will involve actions as follows: First, to complete the first cycle of comprehensive appraisals at DOE operations offices.

Second, expand the evaluation of NRC regulatory initiatives to assure that new safety restrictions for licensed commercial facilities are incorporated into DOE safety policy, where applicable.

Third, develop additional criteria for fundamental training of operators of nuclear reactors and other nuclear facilities and to monitor implementation of training programs.

Fourth, expand the atmospheric release advisory capability to provide around-the-clock, 30-minute responses for departmental facilities.

Fifth, complete prototype production and testing of improved neutron dosimeters for use in departmental facilities.

The environment, safety, and health program to date has assured that national energy policies and agency plans, programs, and operations have effectively addressed and expeditiously resolved environmental and safety problems.

The proposed fiscal 1983 budget provides the resources to continue this level of assurance. At this point, sir, I am prepared to answer your questions.

[The statement follows:]

## STATEMENT OF WILLIAM A. VAUGHAN, ASSISTANT SECRETARY FOR ENVIRONMENTAL PROTECTION, SAFETY, AND EMERGENCY PREPAREDNESS

Mr. Chairman, and members of the Subcommittee, I am pleased to be here today to discuss with you the Department's budget request for FY 1983 for the Environment, Safety and Health Program. With me to assist in responding to your questions, is:

Mr. Robert W. Davies, Deputy Assistant Secretary for
Environment, Safety and Health

The Environment, Safety and Health program manages an independent overview and assessment effort to assure that occupational, health and safety programs in contractor-operated facilities are implemented in accordance with Department standards; that effective environmental and public safety protection programs are carried out; and that the Department is in compliance with applicable environmental regulations and statutes. This program is designed to meet the specific environmental responsibilities and functions assigned to the Department by the DOE Organization Act (Public Law 95-91) and the generic environmental responsibilities mandated by the National Environmental Policy Act, NEPA (Public Law 91-190) and other environmental protection requirements required by Federal, State and local Government legislation. The Environment, Safety and Health program is carried out by two major components: Safety Programs, which relate to current Department operations; and Environmental Programs, which relate to policy formulation, program development and implementation, and compliance.

FUNDING SUMMARY
(Budget Authority in Millions)

| | FY 1982 Appropriation | FY 1983 Budget Request |
|---|---|---|
| Environment, Safety and Health | | |
| Operating Expenses | | |
| Safety Programs | | |
| Nuclear Safety | $ 6.0 | $ 10.4 |
| Quality Assurance and Standards | 0.6 | 1.7 |
| Operational Safety | 25.6 | 16.5 |
| Subtotal...................... | $ 32.2 | $ 28.6 |
| Environmental Programs | | |
| Environmental Analysis | 10.3 | 2.0 |
| Environmental Compliance | 3.0 | 1.5 |
| Subtotal...................... | $ 13.3 | $ 3.5 |
| Program Direction................. | 7.9 | 5.4 |
| Total Operating................. | $ 53.4 | $ 37.5 |

| | FY 1982 Appropriation | FY 1983 Budget Request |
|---|---|---|
| Capital Equipment .................... | 4.0 | 1.5 |
| Total ES&H ..................... | $ 57.4 | $ 39.0 |
| Staffing | 153(2)* | 90(5)* |

* Parentheses indicate other than full-time employees.

## SAFETY PROGRAMS

The Safety Programs component is composed of three offices: The Offices of Nuclear Safety; Quality Assurance and Standards; and Operational Safety.

## NUCLEAR SAFETY

As a result of a major Departmental study on the impact of the Three Mile Island (TMI) nuclear accident, nuclear safety activities were strengthened in 1981 by several new initiatives including the establishment of an Office of Nuclear Safety. This new office, with its special focus, provides an independent overview of the Agency's nuclear operations so as to minimize risks to the safety and health of workers and the public, and to provide for adequate protection of property and equipment. This overview mission is accomplished by developing safety and health policies and standards, assuring their implementation by conducting technical reviews, performing comprehensive appraisals, and by sponsoring special generic technical studies to provide guidance to the nuclear technology programs and field offices. The sub-program also provides emergency response capability for accidents involving actual or potential releases of radioactive material to the environment from the Department's nuclear facilities, and from any other source, public or private.

The basic responsibilities of the Office of Nuclear Safety arise from the Atomic Energy Act of 1954 as amended, P.L. 83-703, which required the Department to prescribe and enforce regulations and orders to protect health and minimize damage to life and property, and exempts the Department's nuclear activities from Nuclear Regulatory Commission licensing. Further, the Department prescribes and enforces effective radiological and non-radiological occupational safety and health standards and, because of this, has not been subject to Occupational Safety and Health Administration regulation in its Government-owned, contractor-operated, nuclear facilities.

## QUALITY ASSURANCE AND STANDARDS

The Quality Assurance and Standards Office, also established as a result of the Three Mile Island study, develops and coordinates the Department's Quality Assurance, Standards, and Metrication policies, overviews the implementation of these policies, and provides assistance to Department program elements in their implementation activities.

## OPERATIONAL SAFETY

The Operational Safety Office develops environmental protection, safety, and health protection policies and standards for Departmental activities not addressed by the Office of Nuclear Safety. This program is responsible for assuring that operational safety responsibilities receive Department-level oversight and management attention. These areas include Government-owned contractor-operated facilities not subject to the Occupational Safety and Health Act; hazardous waste management; air and water pollution control; and Department aviation operations. Also included in the sub-program is the responsibility to assure the adequacy of remedial actions undertaken by the Department to decontaminate sites and facilities contaminated by radioactive material from past nuclear operations. Covered under the remedial action responsibility are sites addressed by the Uranium Mill Tailings Radiation Control Act of 1978 (Public Law 95-604), and others possibly contaminated by operations of the Atomic Energy Commission or the Manhattan Engineer District. Radiological monitoring and associated work, related to former weapons tests in the Marshall Islands and at the Nevada Test Site, is also covered through this sub-program.

## ENVIRONMENTAL PROGRAMS

Sections 102 and 203 of the Department of Energy Organization Act provide direction for Environmental Programs activities by requiring that the Department "....assure incorporation of national environmental protection goals in the formulation and implementation of energy programs..." and provide for functions that include "....advising the Secretary with respect to the conformance of the Department's activities to environmental protection laws and principles...." The Environmental Programs component consists of two subprograms: Environmental Analysis, and Environmental Compliance.

### ENVIRONMENTAL ANALYSIS

The Environmental Analysis subprogram represents the Department's interests in the Federal regulatory development process, maintains comprehensive environmental data bases to permit responsive, substantive analysis of energy-related environmental issues and conducts anticipatory analyses for early identification and scoping of emerging regulatory issues.

### ENVIRONMENTAL COMPLIANCE

The Environmental Compliance subprogram provides support to assure Departmental compliance with the National Environmental Policy Act (NEPA) and associated environmental statutes and regulations. The subprogram formulates Departmental compliance policies and performs a staff-intensive service function for all Agency offices to protect the Department's programs and projects from unnecessary delays due to non-compliance with NEPA and other requirements. The subprogram analyzes the need for documentation and reviews NEPA documents to assure that standards are met.

### FY 1982 ACCOMPLISHMENTS

The ES&H program, which was redirected in Fiscal Year 1981 to more strongly emphasize nuclear safety, will include the following activities in FY 82:

Safety Programs

- Complete comprehensive environmental, safety, and health (ES&H) appraisals of four of the Department's eight Operations Offices.
- Activate the Council on Nuclear Safety for exchange of nuclear safety information among the Department's operating officials and key nuclear safety personnel.
- Implement a nuclear safety training program, including criticality training, fundamentals of reactor operator training, and validation of the training process through self-evaluation.
- Support the Departmental remedial action program, by conducting timely actions to establish priorities and designate sites for the cleanup of properties contaminated with radioactive materials from past government operations; and to certify the adequacy of clean-up efforts and conduct post-remedial action audits and surveys.

- Continue medical care and radiological monitoring of the Rongelap, Utirik and Enewetak people; and complete radiation dose assessments of the remaining atolls.
- Complete the Liquefied Natural Gas experimental test spill program.

Environmental Programs

- Develop a NEPA compliance strategy with the Assistant Secretary for Nuclear Energy, regarding the Department's Nuclear waste repository program.
- Assist Departmental offices in meeting NEPA and other environmental requirements, as evidenced by approximately 320 NEPA Determinations and 200 Document Reviews.

## REORGANIZATION EFFECT AND DIRECTION

The President's FY 1983 Budget request for the Environment, Safety and Health Program is based on the transfer of this Program to an Energy Research and Technology Administration under the Commerce Department. While the overall FY 1983 budget request of $39.0 million is reduced from the FY 1982 appropriation, the principal activity of assuring safety and health at operating facilities, and environmental compliance for applicable projects, will continue. In fact, there will be an increased emphasis to improve the overall safety of Departmental nuclear facilities. This emphasis will involve actions to:

- Complete the first cycle of comprehensive appraisals at the DOE Operations Offices.
- Expand the evaluation of NRC regulatory initiatives to assure that new safety restrictions for licensed commercial facilities, where applicable, are incorporated into DOE safety policy.
- Develop additional criteria for fundamental training of operators of nuclear reactors and other nuclear facilities, and to monitor implementation of training programs.
- Expand Atmospheric Release Advisory Capability to provide around-the-clock 30-minute responses for Departmental facilities.
- Complete prototype production and testing of improved neutron dosimeters in Departmental facilities.

Certain support activities such as the safety evaluations of handling, storing, transporting and utilizing liquefied gaseous fuel; and environmental control technology assessments of developing energy systems are no longer needed and will be eliminated. Planning for reduced efforts in these particular areas stems, principally, from a conclusion that such activities can be best performed in the private sector. This is consistent with changes in other Departmental programs and, correspondingly, it can be expected that there will also be reductions in the number of NEPA document reviews and energy/environment policy analyses.

The Environment, Safety and Health Program has to date assured that National energy policies and agency plans, programs and operations have effectively addressed and expeditiously resolved environmental and safety problems. The proposed FY 1983 budget request provides the resources to continue this assurance.

I am prepared to answer your questions.

# BIOGRAPHICAL SKETCHES

## WILLIAM A. VAUGHAN

William A. Vaughan currently is serving as the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness.

In this position, Mr. Vaughan is responsible for ensuring that the Department's programs are in accord with national environmental, health, and safety regulations. In addition, he directs DOE's energy emergency and contingency planning efforts and has responsibility for the Naval Petroleum Reserves, the Oil Shale Reserves, and the Strategic Petroleum Reserve.

Mr. Vaughan has been Director, Energy Management, Manufacturing Staff, for General Motors Corporation (GM), since 1976. From 1971 until 1976, he was Attorney-in-Charge, Environmental and Energy Law Section. Mr. Vaughan joined GM's Legal Staff as an attorney in 1970. During his tenure with GM, he taught courses in environmental law and energy law at the University of Detroit.

From 1960 to 1970, Mr. Vaughan was on the faculty of Virginia Military Institute (VMI), initially as an instructor and then as an Assistant Professor of Civil Engineering. During the period 1964 to 1967, he served as Deputy Commandant of Cadets at VMI. He currently holds the the rank of Lieutenant Colonel in the U.S. Army Reserves, having served on active duty from 1957 to 1960.

Mr. Vaughan received a B.S. degree in civil engineering with honors from VMI in 1957, an M.S. degree in civil engineering from Purdue University in 1964, and a J.D. degree, magna cum laude, from Washington & Lee University Law School in 1970. He was Editor-in-Chief of the Washington & Lee Law Review and a member of the Order of the Coif.

He is a Registered Professional Engineer in Virginia and is a member of the Engineering Society of Detroit and American and Michigan

Bar Associations. Mr. Vaughan was also a member of the Energy Steering Group and Chairman of the Coal Utilization Subcommittee for the National Association of Manufacturers, on the Steering Committee for the Process Gas Consumers Group, served on the Energy Council for the American National Standards Institute, and has represented GM on the Electricty Consumers Resource Council, He was named "Man-of-the-Year" by Modern Industrial Energy Magazine in May 1980.

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ROBERT W. DAVIES

Robert W. Davies currently is serving as the Deputy Assistant Secretary for Environment, Safety, and Health.

Mr. Davies has responsibility for managing the Department's environmental programs, nuclear safety, operating facilities safety, and quality assurance and standards programs. He serves under William A. Vaughan, the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness.

Mr. Davies, 57, has over 30 years experience as an energy manager with the Baltimore Gas and Electric Company, including experience in designing and managing large fossil and nuclear electric utility projects.

He received a Bachelor of Science degree in mechanical engineering from Texas A&M, a Master of Science degree in engineering from John Hopkins University and obtained nuclear education at the Oak Ridge School of Reactor Technology.

GAO REVIEW OF REACTOR SAFETY

Senator JOHNSTON. Mr. Vaughan, GAO has been somewhat critical of your activities, as you know, your Department's activities. Have you responded to that, or, if not, what is your response?

Mr. VAUGHAN. In what particular area?

Senator JOHNSTON. Regarding reactor operation, reactor safety.

Mr. VAUGHAN. We have formally responded, Senator. I will be glad to furnish for the record a copy of that response. In general, Senator, we felt we were more than adequate and the Department facilities fully met the standards, in some cases exceeding them.

[The information follows:]

## LETTER FROM JAMES B. EDWARDS, SECRETARY OF ENERGY

October 7, 1981

Honorable Patricia Schroeder
House of Representatives
Washington, DC 20515

Dear Mrs. Schroeder:

We have reviewed the General Accounting Office (GAO) Report EMD 81-108, "Better Oversight Needed for Safety and Health Activities at DOE's Nuclear Facilities," dated August 4, 1981.

The Department of Energy's response to the report is enclosed and has been provided to the appropriate Congressional Committees, as required by Section 236 of the Legislative Reorganization Act of 1970. This information has also been provided to the GAO and the Office of Management and Budget.

As was noted in the report, the Department's record of safety performance has been good. Overall, I believe that the Department has provided and continues to provide effective safety and health oversight and assurance programs for operations at our nuclear facilities.

I am concerned that the Department was not given the opportunity to comment on the findings and recommendations of the report before its publication in final form. DOE believes that the GAO fundamentally misunderstood the philosophy of DOE's approach to safety and health. No attempt was made in the report to characterize DOE's approach. Nor was there any attempt to contrast the advantages and disadvantages of the approach favored by GAO, that puts great emphasis on uniformity and centralized management, with the Department's less centralized systems approach. Instead, the GAO cited a few specific, isolated examples of shortcomings to support recommendations for significant changes to the Department's safety and health program. This lack of opportunity to comment is unfortunate since it significantly reduces the usefulness of this report as a constructive, objective analysis for the Department to utilize in its ongoing efforts to review and improve, wherever possible, its health and safety program.

I would like to highlight here DOE's response to GAO's recommendation concerning a Nuclear Regulatory Commission (NRC) review and evaluation of DOE's nuclear facilities. This recommendation specifically addresses your original request to the GAO that initiated the subject report. The GAO report did not note the fact that the NRC capability resides essentially in one area, light water commercial power reactors, and that the NRC lacks expertise in the technology associated with DOE production nuclear reactors and operations. Given this limited NRC technical expertise, it is unclear how NRC involvement would improve the safety of DOE's nuclear facilities or enhance the public perception of the safety record of these facilities--a record that compares very favorably with that of non-DOE facilities. Nor did GAO sufficiently note the high cost in effort and dollars that would be imposed as a consequence of any such review and evaluation by NRC. In DOE's view, this cost would not provide a commensurate benefit. Further, as GAO recognized, NRC oversight of this facet of DOE's defense responsibilities could result in serious interference with overall national security.

In summary, DOE has an effective health and safety program that is substantiated by a good safety record. DOE considers additional NRC oversight of DOE nuclear programs neither necessary nor beneficial.

Sincerely,

James B. Edwards

James B. Edwards

## DOE COMMENTS ON GAO REPORT "BETTER OVERSIGHT NEEDED FOR SAFETY AND HEALTH ACTIVITIES AT DOE'S NUCLEAR FACILITIES"

### EMD 81-108

The GAO report takes as its basic premise the view that the organizational structure of DOE's safety and health oversight program inhibits independence and objectivity. In GAO's view the underlying organizational problem is the decentralized aspects of the DOE safety and health program. To remedy this purported underlying problem, the GAO identified a range of possible alternatives, from reorganizing the entire safety and health function within DOE to having outside agencies, such as the NRC or OSHA, provide safety and health oversight.

In GAO's view the central issue in evaluating any safety and health program would seem to be the degree to which control of that program is centralized and independent of operational management. GAO took as its principal point of departure the view that a centralized and independent system would invariably provide a degree of protection of safety and health unmatched by any less centralized approach incorporated within program line management. GAO made no attempt to characterize the respective advantages and disadvantages of these two approaches, and furthermore, emphasized unduly the process of safety and health management to the virtual exclusion of any consideration of results. Indeed, GAO examined DOE's less centralized approach to safety and health with minimal emphasis upon the past performance under that approach even though, as was noted in the report, the Department's record of safety performance has been good. Although imperfections in DOE's approach were identified, none of them were sufficient to support GAO's recommendation that DOE's program be reorganized. Nor did the GAO report reflect sufficient awareness of the extent to which nuclear safety has in the current Administration become an item of the highest priority at all levels of DOE management, including at the Secretarial level itself.

In addition, there are two fundamental procedural problems in the GAO approach which significantly reduce the usefulness of the report as a constructive tool for the improvement of DOE operations. First, as discussed below, the report does not address recent changes in the DOE safety and health program which might have affected the report's recommendations. (See enclosed May 1981 report entitled "Action Plan in Response to March 1981 Report to NFPQT Committee.")

Second, because DOE did not have an opportunity to comment on the draft report, many of the specific examples used to support GAO's recommendations were taken out of context, were inaccurate, or reflected a misunderstanding of DOE's approach to its safety and health program. As a result of these shortcomings the focus of DOE's response to the GAO report must be: (1) to explain DOE's basic approach to safety and health oversight, (2) to explain the reasons for DOE's reliance upon that approach, (3) to emphasize the favorable results which the DOE approach has produced, and (4) to correct or clarify, chapter by chapter, specific points raised in the GAO report.

1. It is important to note that the premise upon which the Department's safety and health program is based is that safety and health in DOE facilities are program management responsibilities. Program management in the context of DOE nuclear facilities begins with the Under Secretary. Assistant Secretaries have primary responsibility for the development of their assigned programs. Operations Office Managers are responsible to the respective Assistant Secretaries for execution of their programs. Safety is an integral part of the programs. Accordingly, line management responsibility for safe conduct of assigned programs flows from the Under Secretary through the program Assistant Secretaries to the Operations Office Managers. These programs are executed at DOE-owned, contractor-operated facilities. Independent overview of the safety and health program at these facilities is provided by the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, who has no DOE nuclear program management responsibilities that would inhibit the independence of this overview function. The importance of that independent overview function is underscored by the fact that the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, like DOE's other Assistant Secretaries, is a Presidential appointee. In addition to providing an independent overview to the Secretary and program officials of the adequacy of the program's safety and health compliance on a system-wide basis, the Office of the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness is responsible for developing the Department's safety and health requirements. The program Assistant Secretaries assure in the initial planning and budgetary processes that resources are made available to comply with these requirements.

2. As discussed below, on the basis of extensive experience, DOE believes that the degree of protection afforded by this approach demonstrates its effectiveness. In addition, there are significant advantages to this approach in terms of other managerial considerations. First, the primary responsibility for ensuring safety and health is placed upon the individuals who have greatest control over program operations, i.e., the program managers themselves. This situation ensures clear lines of authority for implementing and maintaining necessary safety and health requirements, and assures that primary consideration for safety and health is included in all phases including procurement, development, design, construction, operation and maintenance. Second, in order to be effective, safety and health requirements must be tailored to the design and characteristics of individual facilities. By conferring primary safety and health responsibility upon program managers, the DOE approach provides this essential flexibility. Third, since the

emphasis of this approach is upon performance, and since a degree of managerial flexibility is built into the system, the development of innovative solutions to safety and health problems is promoted.

Another important aspect of the DOE approach is the promulgation, whenever necessary, of uniform safety and health requirements. In this regard the series of existing departmental safety and health orders applicable to all DOE facilities provide what DOE believes to be an optimal standardization of safety and health requirements. In recent months, in the wake of the Three Mile Island accident, there has been an increased recognition among DOE managers that these orders must reflect state-of-the-art knowledge and must be issued more expeditiously than had been done previously. Accordingly, these orders are now reviewed, revised, or new orders issued as a matter of high priority whenever appropriate. The nature of the orders is to outline what should be done rather than how it should be done. The system of orders specifically recognizes the need to maintain the benefits of the less centralized safety and health program, as discussed above.

3. The GAO report failed to compare the results of the DOE program with the record of facilities under OSHA regulation. Indeed, the safety record at DOE facilities compares very favorably with that of the industries regulated by OSHA, as illustrated by Table I, which compares the performance of DOE with the total industrial sector regulated by OSHA, and the chemical and allied products segment (that portion of the industrial sector most closely resembling the DOE system). It must be reiterated that DOE's safety and health program emphasizes performance as the foremost criterion of success.

In the emergency preparedness area, DOE has been lauded for its rapid and effective response to requests from the State of Pennsylvania and the Nuclear Regulatory Commission on March 28, 1979, when the Three Mile Island accident began. Within hours, Department personnel and aircraft were at the scene monitoring the environment for radiation. By the end of the first day, 20 DOE and DOE contractor personnel were involved in monitoring and assessment with double that number there on March 29, and over 100 three days later.

4. For the reasons discussed above, DOE believes that GAO fundamentally misunderstood the philosophy of DOE's approach to safety and health and failed to recognize the positive results of that approach. There are also a number of points

## TABLE I

| Year | Reporting Sector | *Total Recordable Cases Per 200,000 Employee Hours (TRC) | *Lost Workday Cases Per 200,000 Employee Hours (LWD) | *Lost Workdays Per 200,000 Employee Hours (LWD) |
|---|---|---|---|---|
| 1975 | DOE | 3.3 | 1.0 | 17.6 |
| | OSHA | 9.1 | 3.3 | 56.1 |
| | Chemical Industry | 8.4 | 2.9 | 48.9 |
| 1976 | DOE | 3.7 | 1.1 | 19.0 |
| | OSHA | 9.2 | 3.5 | 60.5 |
| | Chemical Industry | 8.2 | 3.1 | 50.6 |
| 1977 | DOE | 2.9 | 1.5 | 16.0 |
| | OSHA | 9.3 | 3.8 | 61.5 |
| | Chemical Industry | 8.0 | 3.1 | 51.4 |
| 1978 | DOE | 2.8 | 1.2 | 18.0 |
| | OSHA | 9.4 | 4.1 | 65.5 |
| | Chemical Industry | 7.8 | 3.3 | 50.9 |
| 1979 | DOE | 2.2 | 1.1 | 17.8 |
| | OSHA | 9.5 | 4.3 | 67.7 |
| | Chemical Industry | 7.7 | 3.5 | 54.9 |
| 1980 | DOE | 2.3 | 1.1 | 17.4 |
| | OSHA | ** | ** | ** |
| | Chemical Industry | ** | ** | ** |

* Sources of Data

DOE - System Safety Development Center, EG&G, Inc., Idaho Falls, Idaho

OSHA - U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C.

**1980 Data for OSHA not yet available.

in Chapters 2 through 6 of the GAO report which require further discussion. The remainder of this DOE response addresses those points on a chapter by chapter basis.

Chapter 2 "Oversight of Worker Protection Programs Needs to be Increased"

- The GAO report states at page 12, "We perceive no difference between the level of safety which should be provided for workers in private industries and DOE nuclear facilities." DOE agrees with this point, but the report fails to note, as indicated earlier, that the protection afforded DOE contractor employees (as reflected in the available performance data) far exceeds that of private industry.

- The GAO report also states at page 6, "DOE needs to (1) be more responsive to employee complaints which may identify serious safety and health hazards; (2) treat safety or health violations in a more formal, uniform manner, including posting citations, setting time limits on corrective actions and following up to ensure prompt correction; and (3) systematically make use of available information to ensure that the most serious hazards are identified and eliminated before injury or exposure occurs." In terms of the first two points, DOE Order 5483.1 establishes requirements for the investigation and response to complaints by DOE officials. This order clearly points out the requirements for posting violations, establishing abatement dates, assuring that corrective actions have been taken and handling "imminent danger" situations. We do not believe that additional delineation of classes of violations such as "serious" or "other" is necessary to achieve more timely abatement of hazards, because the Field Office Managers already have the flexibility to assure such timeliness via other modes as discussed above. DOE agrees that systematic use of information is required and is currently upgrading a computerized Accident and Incident Reporting System in order better to analyze workplace hazard information and to prioritize future safety and health oversight activities based on the results of that analysis.

- The GAO report states at page 6, "In the private sector, OSHA gives employee complaints high priority among their activities, secondary only to imminent danger investigations and investigations of catastrophic or fatal accidents." This statement is somewhat misleading in that it does not clearly point out the fact that OSHA has four priority levels for inspections, and that complaint investigations are assigned priority #3, which does not appear to be "high" on the priority list. The OSHA inspection priorities, as prescribed by OSHA's compliance operations manual, are the following:

  First - Imminent Danger
  Second - Fatality/Catastrophe Investigations
  Third - Investigation of Complaints
  Fourth - Regional Programmed Inspections

- As pointed out in the GAO report at page 6, DOE encourages complainants to attempt initial resolution of their complaints with their employers. In this situation, OSHA similarly attempts to encourage employees to resolve their safety and health complaints with their employers. An important point to note is that DOE procedures allow DOE contractor employees the option of filing complaints directly with the Department of Energy.

- The two specific examples given of complaint resolution problems at the Rocky Flats Plant cited by GAO at page 7 contain erroneous information. In both cases DOE did investigate the complaints and determined that there were no serious hazards. Additionally, in the second example where supposedly there were 14 contaminated air incidents (alarms) in about 5 days, GAO failed to point out that in 13 of these alleged incidents, the radiation concentration guidelines were not in fact exceeded and in the remaining one it is questionable whether in fact the guidelines were exceeded. GAO also failed to mention that subsequent to these incidents, it was discovered that an employee had intentionally caused most or all of the false alarms in the air monitoring equipment. The employee was given a 30-day suspension and removed from plutonium areas for 1 year.

- In the case of the inoperable sump alarm problem at DOE's Richland Operations Office, described on page 10 of the GAO report, DOE's system for tracking and following up on inspection deficiencies was not adequate at that time and may have contributed to the overall delay in corrective action. This system has been improved to assure that similar problems do not recur. Also, in the case of the asbestos concern at Richland, we know of no instances of employee exposure to asbestos in excess of standards. In the November 1980 example, the Hanford Environmental Health Foundation report was in error and has subsequently been revised. All employees were wearing NIOSH approved respirators at that time.

- Violations of standards noted on non-inspection visits to contractor facilities are not necessarily handled "informally" as the GAO report suggests on page 10. For example, violations noted during appraisals are usually noted in the report or handled by separate correspondence with the contractor. Irrespective of the mode of notification--inspection, appraisal or other correspondence--abatement actions are required to be taken by the contractor, and a follow-up of significant violations is conducted by DOE.

- In comparing DOE's procedures to those of OSHA for "de minimis" notices, the GAO report at page 9, notes that DOE's "Savannah River and Richland Operations Offices do not require contractors to post citations of de minimis violations in the workplace, and Richland does not set abatement dates for de minimis violations." The report does not, however, point out that OSHA also does not send de minimis notices to the employers or require posting or abatement. Instead, the notices are sent to OSHA Headquarters for review, analysis and possible future use. The "serious" and "other" type hazards classification scheme of OSHA ultimately determines the amount of fines levied against employers, but does not contribute to the timely abatement of serious hazards.

Chapter 3 "DOE's Radiological Emergency Preparedness Program Needs to be Upgraded"

- On page 16, the GAO Report suggests a centralized coordinated emergency preparedness program is needed at DOE Headquarters. The Department inherited from its predecessor agencies, and has maintained, an effective, high level emergency preparedness program which emphasizes response to nuclear accidents. The success of this program was demonstrated in the Department's response to the TMI accident. The Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness manages the overall DOE emergency preparedness program for DOE-owned nuclear facilities and for response to non-DOE nuclear accidents. The responsibility for managing the emergency preparedness program for emergencies involving weapons and terrorist related nuclear emergencies has been assigned to the Assistant Secretary for Defense Programs in accordance with his nuclear weapons and security program responsibilities and because of his inherent expertise in dealing with these program areas.

The Secretary's reorganization of February 24, 1981, provided for emergency preparedness policy making within the Department to be consolidated in the Office of the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, and the designated Emergency Coordinator for the Department now reports to this Assistant Secretary. Three orders on Emergency Preparedness, replacing interim guidance which remained from the predecessor agencies, were published on August 13, 1981. The orders establish the policy and designate responsibility to appropriate offices. The orders also provide a mechanism for management of major emergencies through the Emergency Action Coordinating Team.

- The GAO report suggested at page 27 that DOE should provide the support necessary to carry out responsibilities delegated by FEMA in its national effort to improve emergency preparedness around nuclear facilities. In an interim rule published on October 22, 1980, FEMA assigned to DOE responsiblity for (a) planning and preparedness for DOE facilities; (b) assisting State and local governments in preparing radiological emergency response plans for DOE facilities; (c) assisting FEMA in developing planning guidance to State and local governments; (d) participating with FEMA in assisting State and local governments in developing their radiological emergency response plans, evaluating exercises to test plans, and reviewing and evaluating the plans and preparedness; and (e) providing representation and support for FEMA's Regional Assistance Committees. No resources for carrying out the assignment were provided to the Department, and there has been no complete budget cycle since formulation of this assignment. Therefore, resources for carrying out the assignments had to be taken from existing authorized programs such as the Radiological Assistance Program. This assistance has been focused in the following areas: (a) assisting in the preparation and review of State and local emergency plans for coping with accidents at commercial nuclear power plants; (b) participating in drills and exercises at commercial nuclear power plants; and (c) assisting in emergency preparedness training for State and local officials. The Department is now taking steps to fund this effort, including allocation of 32 positions to Department field offices to upgrade the nuclear safety program. This allocation will include improved support to FEMA.

- The GAO report suggested at page 27 that DOE should establish requirements for annual appraisals of field office and contractor emergency preparedness programs and independently review and evaluate contractor drills on a regular basis. The Acting Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, in accordance with the revision of DOE Order 5482.1, "Environmental Protection, Safety, and Health Protection Appraisal Program," issued on August 13, 1981, has established a revitalized appraisal program. This program will ensure the conduct of comprehensive appraisals (including emergency preparedness) of each field office on a two-year schedule. The first of these comprehensive appraisals will be conducted at the Richland office in late September 1981. DOE recognizes the desirability of conducting and evaluating contractor and field office drills. Depending on the availability of resources, the Department is planning an enhanced program of large drills simulating a nuclear accident at each of its major installations.

Chapter 4 "Additional Effort Needed to Ensure Safety of DOE's Older Nuclear Facilities"

- GAO stated at page 28 that although DOE began conducting safety analyses for existing facilities nearly 10 years ago, DOE has not established detailed program guidelines or timeframes for completion of these analyses, and as a result many facilities still have not been analyzed to determine what hazards exist.

In March 1979, DOE issued Order 5481.1, entitled "Safety Analysis and Review System," which established uniform requirements for the preparation and review of safety analyses for DOE operations. In accordance with this order all new nuclear facilities completed in the last 10 years (e.g., the Savannah River (SR) and Los Alamos National Laboratory plutonium facilities, the tritium facility at Sandia-Livermore), those in construction (e.g., Gas Centrifuge Enrichment Plant, Rocky Flats plutonium facility), and those in the design state (e.g., Defense Waste Solidification Plant at Savannah River, Waste Isolation Pilot Plant) have had or will have a Safety Analysis and Review prior to operation. In each case, the Safety Analysis and Review has been in preparation since the inception of the respective projects.

Target completion dates pursuant to the Order have been established by the field offices for a Safety Analysis and Review for each existing nonreactor nuclear facility. A Safety Analysis and Review as performed by DOE is an extremely thorough, detailed and costly procedure. As examples of the current Safety Analysis Review activities for existing facilities, approximately $2-3 million per year is being expended by the Oak Ridge Operations Office at the three Gaseous Diffusion Plants in an effort which is expected to extend over the next 3 years. At the Y-12 Plant there is a $5 million effort extending through FY 1987, and at Oak Ridge National Laboratory the effort amounts to $2 million through FY 1985. The National Lead of Ohio review is expected to be finished in FY 1983 and AiResearch is completing a $225 thousand review this year.

Each existing nuclear facility that has not had a completed Safety Analysis and Review has been subject to hazard analyses or evaluations conducted prior to startup and periodic surveillance and inspection efforts after startup. In addition, safety studies, evaluations, design reviews, etc. have been conducted to ensure that modifications, changes or operating problems are adequately understood and appropriate controls established. Thus, although safety analyses have not yet been completed for all existing nonreactor nuclear facilities, their safe operation has been assured by extensive reviews of the facilities, safety improvements, and an ongoing safety program for additional reviews and appropriate safety controls.

- The GAO report at page 31 alleges that DOE does not always eliminate or mitigate identified hazards. Improvements are continually being proposed for DOE nuclear facilities. These improvements may be the result of a newly prepared SAR, an improved safety concept, good safety practice, or any combination of these. A review of the record since the Rocky Flats fire of May 1969 shows that DOE has expended significant funds for environment, safety, and health improvements. A major review program, the "Fire Safety and Adequacy of Operating Conditions" program, begun in 1969, identified over $500 million in upgrading projects throughout AEC. By December 31, 1972, nearly $62 million of the $500 million in Line Item projects alone had been completed. In addition, over $100 million has been expended for operating, capital equipment and general plant projects funds. The single largest project, Project 71-9, of this overall upgrading initiative included the construction of replacement plutonium facilities at Los Alamos National Laboratory and Rocky Flats. The fiscal year 1980 authorization by Congress of an additional $7 million brought the total for Project 71-9 alone to $287 million. Furthermore, DOE's review of authorized Line Item projects identified nearly $80 million for industrial safety and fire protection upgrading in the last 5 budget years alone.

In summary, safety upgrading is a major and continuing program in all DOE operations and one that is conducted at a high level of expenditure.

- The GAO report found at page 33 that in some cases DOE safety personnel, both at Headquarters and in the field, lacked the technical expertise necessary to perform their duties. DOE does not agree that either Headquarters or field personnel to which this comment was directed lack the technical expertise necessary to perform their duties. Nevertheless, DOE recognizes the crucial importance of technical expertise in the safety area and is actively taking steps to enhance the quality of its safety expertise by, for example, emphasizing a high level of technical skills in filling the previously discussed 32 new safety positions recently allocated to the field offices.

- The GAO report at page 34 pointed to the plutonium processing facility at the Mound site at Miamisburg, Ohio, as an example of problems in the Safety Analysis and Review program. In this case the Safety Analysis and Review concluded that the plant could continue to operate without hazard to the employees, the public and the environment, except for the potential dispersing of plutonium oxide as a consequence of seismic and tornado events. The GAO report did not point out that, as a result, DOE relocated those processing operations having the potential for dispersion of plutonium oxide to new facilities at the Savannah River Operations and Los Alamos sites and closed the processing operation at Mound. The GAO report also incorrectly noted at page 34 that a $1.5 million project to upgrade the plutonium processing facility to resist tornadoes was not funded by DOE. Actually, the $1.5 million project was to relocate water towers that provide fire protection to part of the Mound site. The water towers could have failed in the event of a tornado, and possibly have fallen on the plutonium processing facility. This particular upgrade project was authorized in fiscal year 1980. Although these towers no longer represent a hazardous situation with the relocation of the plutonium operation to Savannah River, the towers are still important for fire protection and are being rebuilt because of the tornado risk.

## Chapter 5 "Opportunities to Increase Reliability of Radiological Monitoring Program"

- The GAO report suggests at page 40 that DOE issue radiological monitoring oversight (appraisal) requirements for mandatory application to all DOE facilities. In fact, DOE Orders 5480.1 and 5482.1 already make basic monitoring and reporting requirements mandatory at all DOE facilities. These Orders are supplemented by detailed guidance in DOE/EP-0023, to ensure that all substantive aspects of basic Departmental requirements are addressed.

Flexibility, purposefully built into the program, is necessary for the effective and efficient operation of DOE environmental programs because of the great variability in function and environmental setting of each DOE facility. Each facility is unique in regard to the types, quantities and forms of radionuclides that can be released to the environment. The characteristics of the receiving environments also vary from site to site. Such parameters uniquely determine the type, location, and frequency of sampling at each particular site. For example, in the case of domestic well monitoring, if a well is down-gradient and near a facility handling a highly mobile species such as tritium, sampling must be more frequent than if the well is near a facility handling a radionuclide that would move slowly in groundwater. Another important factor in determining intensity of environmental sampling is the indepth nature of monitoring programs at DOE sites. That is, DOE facility effluents are monitored prior to and during their release to identify problems long before they can accumulate to measurable levels in offsite environmental media. Each point of release is assigned an operating limit which if exceeded would result in corrective action to prevent the release of unacceptable levels of radioactive materials to the environment. Therefore, emphasis is placed on ensuring immediate and reliable detection of radioactive materials in the effluents as well as in environmental media.

Overall, DOE believes that it has an effective environmental monitoring program, but recognizes the need for diligence in ensuring reliability and quality in sample collection, analysis, evaluation, and reporting.

- The GAO report suggests at page 40 that DOE develop a coordinated system whereby radiological monitoring data supplied by operating contractors is verified with data from State or local government agencies with monitoring capability. The use of State and local environmental data to verify DOE contractor monitoring results is one of the means that frequently are used by contractor and field office staff to check the correctness of contractor generated environmental data. DOE believes, however, that it has established more effective and efficient means of assuring data quality and reliability, in that the DOE contractor radiological monitoring programs are far more extensive and sophisticated than the respective State and local programs and therefore provide greater statistical quality in the contractor data. Further, the assurance of quality in DOE contractor environmental monitoring is far more fundamental than the comparison of a few data points derived by an independent agency. Of greater importance to DOE are: contractor management sensitivity to Quality Assurance (QA) needs; qualified contractor personnel; adequate funding; the existence of a contractor QA program in support of the monitoring and analytical program; written procedures for monitoring, analysis and QA; a well designed monitoring program; high quality equipment and facilities for calibration, monitoring, sampling and analysis; internal periodic self audit and assessment; use of laboratory standards and inter-laboratory comparison services; independent overview (including appraisal) by DOE; and systems of records for the QA, internal audit and overview activities.

It is important also to note that EPA, States, local jurisdictions, the press, and others routinely are provided copies of site environmental monitoring reports and have every opportunity to question any of the data reported.

- The GAO report notes at page 38 that substantive errors occurred in a 1979 report concerning monitoring data at the Pantex Plant. The errors cited in that report are regretted, but they proved to be inconsequential. The errors occurred not in the 1979 report, as stated by GAO, but in the 1977 and 1978 reports. Dummy effluent data used to test a modeling program were inadvertently left in the program at the time the annual population dose was calculated for use in the site reports. As a result, the population dose was underestimated by a factor of ten. However, since the correct calculated dose was about 0.0001 percent of the permissible dose, either estimate of the population doses would have been inconsequential.

### Chapter 6 "Changes in Safety and Health Oversight for DOE's Nuclear Facilities Can Increase Independence and Uniformity"

#### GAO Recommendation

"Most of the problems noted during our review can be corrected by reorganizing DOE's safety and health program and by implementing specific corrective action. One situation, however, does not appear to be correctable by these actions, but does seem to be more suited to a cooperative arrangement between NRC and DOE. In the past, DOE's efforts in ensuring the safety of its facilities have not been adequate. Of particular concern are those cases where safety analysis reviews have been conducted, but have failed to identify hazards which exist at the facility. A lack of technical expertise by DOE safety and health staff, acknowledged by DOE officials, may have contributed to the incompleteness of these reviews. As a result, we believe that consideration should be given for an independent technical review of DOE's safety analysis program for nuclear facilities. Although such a review will undoubtedly involve the commitment of additional staff and resources, we believe that the Congress should consider legislation to require NRC to review and evaluate a number and a variety of DOE's nuclear facilities and processes, including detailed review of plant operations, the contractors safety analysis methodology and report, and actions taken to mitigate hazards. This evaluation should also examine the adequacy of DOE's review of the safety analysis document. NRC should report to the Congress on the results of its review and evaluation within 1 year. Suggested legislative language to implement this program appears as appendix 1 to this report."

#### DOE Comment

In the brief discussion in the GAO report about possible disadvantages that would accompany an extension of NRC's regulatory authority to DOE facilities, it is accurately noted that NRC's role could well have an adverse impact on DOE's national security mission in that the number of people with access to classified/restricted data information and nuclear weapons data would increase substantially. Not sufficiently noted, however, is the high cost in effort and dollars that DOE believes would be routinely imposed as a consequence of any such NRC role, a cost that in DOE's opinion would not provide compensating substantial benefit. Also, the GAO did not note the fact that the NRC capability resides essentially in one area, light water commercial power reactors, and that the NRC lacks expertise in the technology associated with DOE production nuclear reactors and operations. Given this limited NRC technical expertise, it is unclear how NRC involvement would improve the safety of DOE's nuclear facilities or enhance the public perception of the safety of these facilities.

It must be understood that NRC has an arms-length relationship with its licensees and can only require actions for which there is authority under law. DOE, on the other hand, has a very tight control over the actions of contractors at its facilities. Many of these facilities have unique functions or specific military requirements. These facilities are government-owned; they are operated in accordance with government direction; and their overall level of safety is in accordance with funding actions taken by the Executive Branch and the Congress. In the past, substantial funds have been spent to upgrade facilities and to build new plants, such as the plutonium buildings at Rocky Flats and Los Alamos, which are in the forefront of protective design. Indeed, DOE provides NRC with data and expertise in developing its standards. In short, DOE is not just another nuclear operator but rather is a key element of the government's program to ensure the proper development and safe operation of nuclear power. Moreover, nuclear safety is a concern to which DOE's top management, including the Secretary, Deputy Secretary, and Under Secretary are all deeply committed. Indeed, the Secretary of Energy recently identified DOE's defense programs, including the safety aspects of those programs, as DOE's top priority. DOE has both the competence and the control necessary to make sure that the government-owned plants are operated safely, and its record compares favorably with any other segment of the industrial sector, including that regulated by NRC. Therefore, DOE sees little that would be accomplished by an NRC review of the DOE safety analysis program, and the attendant cost of such review would be very high.

## LIQUIFIED GASEOUS FUELS SAFETY

Senator JOHNSTON. I notice your LNG and fuel safety work for which you had $6.6 million in 1982 is eliminated. Why is that, because we are not importing much LNG anymore?

Mr. VAUGHAN. We felt, Senator, that was an activity that more appropriately should be done and could be done by the private sector. We have had meetings with the private sector, specifically the LPG Association, the AGA, API, INGA, and others who have interest in gaseous fuels. We explained to them our intentions with respect to shutting down this program as a Federal activity and our intentions, if they were interested, to package the data gathered heretofore in such a manner that they could make constructive use of it and those discussions are ongoing and in progress now. We fully intend to make available to the private sector the data that the Government has developed heretofore.

Senator JOHNSTON. I will have a number of questions in writing, Mr. Vaughan, which we would like you to respond to.

## MARSHALL ISLANDS ACTIVITIES

The budget includes $6.4 million for health and environmental activities at the Marshall Islands. Would you like to answer in writing or can you tell me at this point what the justification for that is?

Mr. VAUGHAN. Let me just briefly explain, Senator, and if you need more information, I will be glad to give a more comprehensive response for the record.

Essentially, the Department of Defense and the old AEC conducted extensive weapons testing in that area of the world some years ago. We have subsequently discovered and are concerned with the effects on the inhabitants of the Marshall Islands. It falls in my lot with the inherited programs to see that level of protection and remedial action on Marshall Island inhabitants is maintained. It is for that reason that the Marshall Islands is funded at present.

Senator JOHNSTON. What are you going to use the money for?

Mr. VAUGHAN. Specifically, Senator——

Senator JOHNSTON. If you would like to, you can furnish that for the record.

Mr. VAUGHAN. There are claims that are inserted and there is health service monitoring provided by the Government. And I will provide the other details for the record. That is a very detailed program, quite comprehensive.

[The information follows:]

### MARSHALL ISLANDS AND RELATED SITES FISCAL YEAR 1983 BUDGET PROGRAM AND MEDICAL CARE ACTIVITIES

The fiscal year 1983 budget of $6.4 million includes not only the funds required to continue the Department's responsibilities in the Marshall Islands, but also the Department's programs of a similar nature in other locations, plus limited support capability. The specific budget breakdown includes:

*Marshall Islands programs*

| | |
|---|---|
| Medical care and treatment | $1,350,000 |
| Radiological monitoring, research, and dose assessments | 1,971,000 |
| Ship logistical support | 824,000 |
| Subtotal, Marshall Islands program | 4,145,000 |
| Offsite dose reassessment studies at the Nevada Test Site | 1,505,000 |
| Support for environment, safety, and health program development (Palomares, criteria and standards, health effects) | 750,000 |
| Total | 6,400,000 |

Public Law 95–134 obligates the Department to provide for medical care and treatment of those persons on Rongelap and Utirik who have experienced radiation-related illnesses and disease. Via interagency agreements, the Department serves in an advisory capacity on radiological matters to the Departments of the Interior and Defense.

During fiscal year 1982, three medical visits, each lasting 2 to 3 weeks, are being carried out in order to fulfill the Department's responsibilities to the Rongelap and Utirik people under Public Law 96–134. These visits of medical personnel are directed and managed for the Department by the Medical Department of the Brookhaven National Laboratory. The visits include clinical examinations, hematological, and biochemical analyses, radiographic examinations, and such other procedures as may be appropriate. When necessary, referrals are made to other locations (e.g., Honolulu, the U.S. mainland) for further tests and/or treatment. The physicians present during these visits are drawn from the leading medical centers of the country (e.g., National Institutes of Health, Case-Western Reserve University Medical Center in Cleveland) and are specialists in their field. In addition, a physician in the employ of the Brookhaven National Laboratory is located throughout the year in the Marshall Islands in order to provide for medical coverage during the intervals between the aforementioned visits.

### EDGEMONT URANIUM MILL TAILINGS

Senator JOHNSTON. Senator Abdnor.

Senator ABDNOR. A personal item with me.

Mr. Vaughan, you are familiar with the problem of South Dakota—I am talking about Edgemont—about the mill tailings.

Mr. VAUGHAN. I am familiar in general, Senator, with the mill tailings problem.

Senator ABDNOR. We had everything ready to go and it still didn't fit in with the law. We have corrected that now with the last piece of legislation that Senator Simpson reported.

I point that out to you because it was a problem with your agency. I don't know what happened a few years back. I think the tailings, places around the city of Edgemont, they have built housing over it. The original company that was mining went out of business. I think we have the problem corrected now with this legislation. I just mention that to you.

Mr. VAUGHAN. Mr. Davies, I guess, is more familiar with it. We are involved, Senator, in my shop, in insuring that that kind of activity is properly done by the Department.

Senator ABDNOR. We hope it is properly done now. It is all cleared up so they can go ahead and do it. It has been a tremendous problem. All the housing in the city condemned and people left holding their houses because they are unable to use them because of a mistake that was made through no fault of their own.

We are very grateful that we are finally getting some corrective legislation to let the proper agency go ahead and clear that situation up.

Mr. VAUGHAN. Yes, sir.

Senator ABDNOR. Thank you.

### STRATEGIC PETROLEUM RESERVES INVESTIGATION

Senator JOHNSTON. You are also responsible for Strategic Petroleum Reserves?

Mr. VAUGHAN. Yes, sir.

Senator JOHNSTON. Are you doing the investigation on those charges that were made about the wrong kind of oil being put in some of the domes?

Mr. VAUGHAN. Senator, I am cooperating with that investigation. That investigation is very comprehensive and involves our own IG and the Federal Bureau of Investigation and Organized Crime Task Force, and so my role in this has been, and as you know, the scope. The focus of the investigation is in the era 1977. During the period of time before the program had pipelines by Choctal and was engaged in barging. The allegations, essentially, are some quantity of oil and one or more of the caverns, specifically one, may have been substituted and there is junk oil, so-called waste oil.

We have cooperated in the sampling. The samples, of course, because of the criminal nature of the investigation, have gone out of my jurisdiction and are in the chain of custody situation now.

I have arranged for the sampling, but I will not receive the results back until the grand jury or strike force is finished with it.

Senator JOHNSTON. You are not in a position to say now whether there is any merit at all to the charges?

Mr. VAUGHAN. No, sir; I can only tell you that from an audit point of view and a managerial point of view, looking back at the records and the level of safeguards that one would consider reasonable, meaning sampling when deliveries were made, signing tickets, and so on, that it would appear on the face of it that the Department's activities, some 5 years ago, were proper and appropriate. And it would appear to me then if such substitution was made in any significant quantity, it would have had to involve rather significant payoff in order to neutralize the checks and balances in that system. My view is all of this sort of thing only provides so much protection and it seems to me our predecessors had set up a reasonable and prudent amount of protection, and I am very hopeful that we will find that there are no problems, since I will have to clean up the mess if there is.

There have been some concerns that the oil, if contaminated, would ruin refineries, and so on. I do think, in general, these concerns are unfounded unless there was massive substitution, and I find that hard to believe, because even waste oil is still oil.

Senator JOHNSTON. Waste oil is crank case oil.

Mr. VAUGHAN. That sort of thing, yes. It is still oil, and refineries do sample before they inject crude. So the idea that it will wreck our refining industry, I think, is a little ill-founded. I think we are essentially talking about the possibility of some fraud and, of course, that is not insignificant, but I do not think it wrecks the program or that sort of thing. And for that matter, unless a massive quantity, relative to the cavern size, was injected, the crude there is not useless. It still would be useful.

Senator ABDNOR. I would just like to say that may be all very true, but the very fact it was allowed to happen is a terrible reflection on everyone, from Congress, the Department, and everyone else. I am pleased to hear that it won't wreck the refining plants, but I do not think we can stand to let this become obvious. Are you giving reports on the findings, if they find oil that has been——

Mr. VAUGHAN. Senator, this is now in a criminal investigation and so I really, initially, will not receive those reports back so that we do not contaminate that chain of evidence. But as soon as that is releasable, it will immediately come back to the program and, of course, we will take whatever action appears to be appropriate.

Senator ABDNOR. When evidence is found, it will be turned over to whoever the proper—whoever that is.

Mr. VAUGHAN. Absolutely, Senator. Law enforcement authorities are involved and have been involved. We are simply an agent or facilitator. Of course, my interest is in carrying out their bidding and not screwing it up from a custody point of view so that if there has been someone who has defrauded the Government, they get off over some legal technicality.

We are trying to be very careful with that.

I do have to say this. The oil in those caverns, because there are temperature differentials in salt storage, has mixed within about a year; there is a general temperature grade down the depth of that cavern, any cavern, and so the oil will tend to homogenize. So, again, it is my opinion that there will have to have been a very significant substitution to be detectable by testings at different levels. So the test results may not be totally determinative.

Senator JOHNSTON. I might tell my colleague, the indication I get from down there, the charges will probably be found to be not proper, without foundation.

## CLOSING REMARKS

Mr. Vaughan, Dave Gwaltney of our staff says you were his faculty adviser at Virginia Military Institute. He wants you to know he harbors no malice. It may only seem you are getting a more stringent budget scrutiny compared to other programs, but that is the staff's job. He wants you to know that. [Laughter.]

Mr. VAUGHAN. I guess turnabout is fair play, anyway.

## ADDITIONAL PREPARED QUESTIONS FOR THE RECORD

Senator JOHNSTON. Thank you very much, gentlemen. There are some questions for you to provide answers for the record.

Mr. VAUGHAN. We will be pleased to provide them.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY SENATOR HATFIELD

### FY 1983 Programs Being Reduced

Question: Mr. Secretary, a brief review of the FY 1983 funding request for environmental, safety, and emergency activities would indicate that the Department and Administration does not place a high priority on this type of research work.

For example:

- -- LNG and fuels safety work $6.6 million in 1982 is eliminated and
- -- Environmental program activities down to $3.5 million from a current level of $13 million.

Please comment more specifically about the basis and reasons for the cut back in this type of work.

- -- What evidence do you have that other Federal agencies or private industry is going to fill in the void created by these reductions?
- -- Do you believe that the budget submitted for these programs is adequate and sufficient to provide for meaningful research program?

Answer: We fully expect the gas industry to continue the necesssary LNG safety research in support of their industrial activity, and have met with industry representatives on March 30, 1982 to brief them on program objectives and accomplishments to encourage their consideration of safety research.

The Environmental Programs activities have been reduced in accordance with the responsibilities of this Administration versus industry for the development and demonstration of energy systems. The budget request is sufficient to carry out our Environment, Safety and Health efforts in FY 1983.

### Marshall Islands and Related Sites

Question: The budget includes $6.4 million, down from the $6.6 million for the current year, but the justification does not lay out how the funds will be used. Could you provide a detailed breakout for the record:

Answer: The fiscal year 1983 budget number of $6.4 million includes not only the funds required to continue the Department's responsibilities in the Marshall Islands, but also the Department's programs of a similar nature in other locations, plus limited support capability. The specific budget breakdown includes:

| | |
|---|---|
| Marshall Islands Programs | |
| Medical care and treatment | $1,350 |
| Radiological monitoring, research and dose assessments | 1,971 |
| Ship logistical support | 824 |
| Sub-Total | $4,145 |
| Offsite dose reassessment studies at the Nevada Test Site | $1,505 |
| Support for Environment, Safety, & Health Program Development (Palomares, criteria and standards, health effects) | 750 |
| Total | $6,400 |

Question: Where will the $200,000 reduction in 1983 be made?

Answer: The reduction of $200,000 in the overall Marshall Islands Programs budget area, from $6.6 million in FY 1982 to $6.4 million in FY 1982, will affect support for criteria and standards investigations and health effects studies. Funding for activities in the Marshall Islands, themselves, will be held essentially constant at $4.145 million. The comparable 1982 figure for this latter work is $4.151 million.

Question: Are the funding levels for FY 1982 sufficient to carryout DOE's statutory and moral responsibilities? Discuss the specific statutory and interagency requirements for each of the Federal agencies involved, the funds allocated by each for the current year, and the budget levels for FY 1983.

Answer: Yes, the funding level for FY 1983 is sufficient to carry out DOE's statutory and moral responsibilities. Public Law 95-134 obligates the Department to provide for medical care and treatment of those persons on Rongelap and Utirik who have experienced radiation related illness and disease. Via interagency agreements the Department serves in an advisory capacity on radiological matters to the Departments of the Interior and Defense. Budgets related to health care and personnel and environmental radiological monitoring in the Marshall Islands for fiscal years 1982 and 1983 follow:

| | 1982 | 1983 |
|---|---|---|
| Department of Energy | $4,151 | $4,145 |
| Department of the Interior funds transmitted via the Trust Territory of the Pacific Islands to the Government of the Marshall Islands for general health care. (Additional funds are appropriated by the Government of the Marshall Islands) | 2,305 | 2,066 |

Question: What is being done to provide the required medical care?

Answer: During fiscal year 1982 three medical visits, each lasting 2-3 weeks, are being carried out in order to fulfill the Department's responsibilities to the Rongelap and Utirik people under Public Law 96-134. These visits of medical personnel are directed and managed for the Department by the Medical Department of the Brookhaven National Laboratory. The visits include clinical examinations, hematological and biochemical analyses, radiographic examinations and such other procedures as may be appropriate. When necessary, referrals are made to other locations (e.g., Honolulu, the U.S. mainland for further tests and/or treatment. The physicians present during these visits are drawn from the leading medical centers of the country (e.g., National Institutes of Health, Case-Western Reserve University Medical Center in Cleveland) and are specialists in their field. In addition, a physician in the employ of the Brookhaven National Laboratory is located throughout the year in the Marshall Islands in order to provide for medical coverage during the intervals between the aforementioned visits.

## Liquefied Gaseous Fuels Safety Program

Question: What is the justification for cancelling the Liquefied Gaseous Fuels Safety Program just as it is reaching the high-payoff stage of its research, particularly when, as recently as April of 1981, Mr. Barton House stated in a letter to the AGA that progress was good and it was the DOE's intention to continue to pursue the program?

Answer: The Administration's position is to support long-term research which industry is not capable to undertake because of the long-term period and technical problems to be solved before economic return can be expected. In the case of the Liquefied Gaseous Fuels (LGF) the gas industry is the active component interested in promoting importation and use of LGF and it is capable of doing whatever safety research is needed.

Question: Is there a plan for involving private industry? What steps have you taken? What evidence do you have of industry willingness to participate?

Answer: We plan to offer the results of our safety research to industry so that they can make constructive use of the data that the Government has developed. We have had meetings with the private sector, specifically the LPG association, the American Gas Association, the API, the INGA, and others who are interested in gaseous fuels and have explained to them our intentions with respect to shutting down the federal activity and our intention, if they are interested, to provide packaged data. The industries willingness to meet with DOE is positive evidence of their interest in considering safety research which is related to their industrial activity.

Question: What will be the consequences to public safety if the LGF work does not continue?

Answer: There is no consequences to public safety as we fully expect industry to perform the safety research and testing which is necessary to support their industrial activity.

Question: How will the government fulfill its obligation to protect public safety without the information this program was to provide?

Answer: The public safety of LGF import and use will be reviewed by the FERC and State Public Utility Commissions during licensing hearings.

Question: Why did you not accept funds added OMB in its passback for FY 83 to allow continued government participation in this program?

Answer: The OMB's passback was to allow for orderly closeout of safety testing efforts; however, the DOE determined that orderly completion of testing and packaging of data could be finished by the end of FY 1982 and therefore funds were not needed in FY 1983.

Question: What steps are you taking to assure that the technical capability to assess the hazards of chemical spills built up over the last four years, doesn't simply disappear when the DOE funding ceases?

Answer: The results of safety research will be packaged for use by industry and governmental agencies. The technical personnel involved in safety research at the laboratory and contractors may be funded by the industrial associations if desired.

Question: Other federal agencies need the results of the DOE large-scale program to help reduce the consequences to public safety of spills of other hazardous chemicals. If the DOE stops its program in midstream, how will they now solve their problems?

Answer: The Coast Guard and the Department of Transportation have cooperated with the DOE in the safety research on LGF and they are fully aware of our closeout plans. If they should need additional data related to the safety of transporting LGF these agencies could fund that research or look to industry to provide data when licenses/permits are requested.

Question: Would you be willing to assume responsibility for making a facility available at the NTS, bringing a cooperative interagency program together and ensuring that the technical capability is maintained until those interested in specific experiments can arrange to support them.

Answer: We fully expect that the gas industry will perform the necessary safety research in support of their industrial activity, so therefore it would be non-productive for the DOE to undertake facility studies or any other supporting research activity. However, we would support the concept of making space at the NTS available to the gas industry to conduct their tests.

## Environmental Protection, Safety, and Emergency Preparedness Programs

Question: Mr. Secretary, a brief review of the 1983 funding request would indicate that the Department and Administration does not place a high priority on this type of research work. For example:

-- Carbon dioxide research cut by 30%.
Please comment more specifically about the basis and reasons for the cutback in this type of work.

Answer: We believe the funds budgeted for the carbon dioxide program are adequate in view of maintaining a balanced research program within overall budgetary stringencies. We felt this was an area which could sustain reductions, since several projects have come to completion and many projects are at a less expensive stage of effort, such as data analysis vs. data collection.

What evidence do you have that other Federal agencies or private industry is going to fill the void created by these reductions?

Answer: As you are aware, the Department of Energy (DOE) is not the only agency involved in the research on carbon dioxide, nor is the U.S. the only nation. Our research is coordinated by the National Climate Program Office, administered by the National Oceanic and Atmospheric Administration (NOAA), and by the Interagency Committee on Carbon Dioxide and Climate, which is chaired by DOE. The other agencies involved, in addition to NOAA and DOE, are the National Science Foundation, the Department of Agriculture, the National Aeronautics and Space Administration, the U.S. Geological Survey, the State Department, the Environmental Protection Agency and the National Bureau of Standards. In view of this multi-agency involvement, we believe the program will be adequately supported in FY 1983.

Question: Do you believe that the budget submitted for these programs is adequate and sufficient to provide for a meaningful research program?

Answer: The Administration recognizes the importance of the carbon dioxide issue. The Department of Energy is firmly committed to a balanced program that will answer the associated critical questions. Our request for FY 1983 is $8 million. With this amount, we are convinced that we can plan and continue a program of research that will answer the fundamental questions in a timely way. I believe that this amount is a satisfactory compromise between the clear need at this time to reduce Federal expenditures and the unquestioned importance of the carbon dioxide problem. We plan to use the larger FY 1982 funding to bring some of the less central research to a timely and cost effective conclusion, and to concentrate our FY 1983 effort on the most essential components.

Question: Mr. Secretary, a brief review of the 1983 funding request would indicate that the Department and Administration does not place a high priority on this type of research work. For example: Health and environmental risk (Analysis Program) eliminated.
Please comment more specifically about the basis and reasons for the cut back in this type of work.
What evidence do you have that other Federal agencies or private industry is going to fill in the void created by these reductions?
Do you believe that the budget submitted for these programs is adequate and sufficient to provide for a meaningful research program?

Answer: The purpose of the Office of Health and Environmental Research (OHER) is to conduct a comprehensive and an authoritative program of health and environmental research which will provide information necessary to reduce uncertainties concerning the potential health and environmental impacts that could necessarily impede the safe and cost-effective implementation of national energy policy. The Health and Environmental Risk Analysis Program (HERAP) does not produce new research information. The program will not be funded in FY 1983 in order to maximize support for research in a year of extreme budget stringency.

Although several private organizations (e.g., Electric Power Research Institute, Gas Research Institute), Federal agencies (U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission) are performing risk analyses regarding the potential impacts of energy technologies, we do not have any evidence that other Federal agencies or private industry is going to fill in the void created by the termination of this program.

Since the program will be terminated in FY 1983, the question concerning whether or not the budget submitted for these programs is adequate and sufficient is not applicable in this case.

## SUBCOMMITTEE RECESS

The subcommittee will stand in recess subject to call of the Chair.

[Whereupon, at 3:15 p.m. Thursday, April 22, the subcommittee was recessed to reconvene at 2 p.m. Thursday, May 13.]

# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 1983

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THURSDAY, MAY 13, 1982

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
*Washington, D.C.*

The subcommittee met at 2:05 p.m. in room 1318, Everett McKin-ley Dirksen Senate Office Building, Hon. Mark Hatfield (chairman) presiding.

Present: Senators Hatfield, McClure, Schmitt, and Huddleston.

## DEPARTMENT OF ENERGY

### NUCLEAR FISSION AND URANIUM ENRICHMENT PROGRAMS

### STATEMENT OF SHELBY T. BREWER, ASSISTANT SECRETARY FOR NUCLEAR ENERGY

ACCOMPANIED BY:

- WILLIAM R. VOIGT, JR., ACTING DIRECTOR, OFFICE OF URANIUM ENRICHMENT AND ASSESSMENT
- SHELDON MEYERS, DEPUTY TO THE DEPUTY ASSISTANT SECRETARY FOR NUCLEAR REACTOR PROGRAMS
- FRANKLIN E. COFFMAN, DEPUTY ASSISTANT SECRETARY FOR NUCLEAR WASTE MANAGEMENT AND FUEL CYCLE PROGRAMS

Chairman HATFIELD. The hearing will come to order.

This afternoon we complete our examination of the fiscal year 1983 budget request for the Department of Energy. The purpose of this hearing today is to receive testimony from the administration on nuclear fission and uranium enrichment programs.

On behalf of the subcommittee members, I welcome Dr. Shelby Brewer, Assistant Secretary for Nuclear Energy, and his colleagues.

#### PREPARED STATEMENT

Mr. Secretary, your entire statement as you have presented it to the committee staff will be placed in the record, and if you would like to summarize the 75 pages of testimony, I would be very appreciative, after you present to us and introduce your colleagues who have accompanied you.

Dr. BREWER. Thank you, Mr. Chairman.

[The statement follows:]

## STATEMENT OF SHELBY T. BREWER, ASSISTANT SECRETARY FOR NUCLEAR ENERGY

Mr. Chairman and Members of the Committee, I am pleased to appear before you to discuss the Agency's nuclear fission energy programs.

The fission energy funding request for FY 1983 is $1,017 million in budget authority, compared to $1,089 million in FY 1982. Distribution of the funds among the program elements is as follows:

| | FY 1982<br>(in millions) | FY 1983 |
|---|---|---|
| Converter Reactor Systems | 96 | 32 |
| Breeder Reactor Systems | 647 | 577 |
| Advanced Nuclear Systems | 38 | 31 |
| Commercial Waste Management | 210 | 81 |
| Nuclear Waste Disposal Fund | -- | 185 1/ |
| Nuclear Fuel Cycle | 53 | 59 |
| Remedial Actions | 43 | 50 |
| Uranium Enrichment | 1,709 | 1,930 2/ |
| Advanced Isotope Separation | 86 | 34 2/ |
| Uranium Resource Assessment | 10 | 3 2/ |

1/ Legislation authorizing the Waste Disposal Fund is not included in this request for appropriations.

2/ Offset by projected revenues of $2,033 million.

Mr. Chairman, today nuclear energy is providing approximately 12 percent of our country's total electrical supply. This year it is projected to become the second largest generator of electricity, surpassed only by coal. By 1990, as additional plants in the pipeline begin operation, its contribution will increase to between 22 and 25 percent. This is an impressive performance, but I am convinced that nuclear energy can and should contribute far more to our future energy security. The nuclear option is capable of providing hundreds of years of economic electrical power, independent of foreign energy sources, while allowing us to conserve our fossil fuel for other critical applications. Achievement of this goal is predicated on the establishment of a fully integrated fuel cycle and power generation system. The essential elements of this system include a smoothly functioning light water reactor industry, a completed fuel cycle including effective reprocessing and waste management systems, and the timely introduction of the breeder reactor.

On October 8th of last year, President Reagan announced a revised nuclear policy that recognizes both the potential of nuclear energy and the impediments currently restricting its full use. To remove these barriers and allow nuclear power to compete, free of constraint, in the marketplace, several major policy initiatives were announced. They include regulatory and licensing reform, lifting of the ban on commercial reprocessing, accelerated deployment of Federal waste management capabilities, and resumption of breeder development, including completion of the Clinch River Breeder Reactor (CRBR). These directives provide the major thrust of the programs that I will discuss today.

At my confirmation hearing last summer, I pledged my intention of using a "management-by-objective" approach in the planning and execution of our nuclear programs. Adhering closely to this principle, we have directed our research and development to the few large national objectives with which we have been charged. We believe strongly that the resulting, sharply focused programs are both technically sound and cost effective. Our FY 1983 budget proposal eliminates program elements that are not directly related to our major objectives. The remaining elements have been carefully structured to insure maximum effectiveness. As a result, our nuclear activities other than waste management are reduced 16 percent relative to the FY 1982 appropriations. This represents a reduction of 31 percent for programs other than CRBR.

In comparing the budget requests for the individual programs, one distinction should be kept in mind. The amount requested does not necessarily reflect the relative importance of the program. For example, as you will note, the request for our Light Water

Reactor Programs is relatively quite small, showing a sizeable decrease from the FY 1982 request. Without doubt, we consider resolution of the issues facing the LWR of primary importance and, indeed, prerequisite to deployment of advanced nuclear options such as the breeder. The reason for the comparatively low request is that LWR technology has been developed, demonstrated, and in use commercially for 25 years.

The need for continued Federal involvement pertains generally to the resolution of regulatory and institutional concerns, with R&D limited to specialized areas such as our TMI cleanup activities. This accident has provided a unique opportunity to obtain important R&D data of generic value to the improved safety of LWRs. Federal Government participation in the cleanup is limited to those tasks that are of broad national benefit or that relate to the Federal responsibilities, under the Atomic Energy Act of 1954, to ensure safe disposal of nuclear waste.

In addition to our research to improve LWR technology, we are responding to the President's policy directive by participating in an effort to identify and alleviate the institutional ills currently confronting the nuclear option. We expect to make recommendations in the near future regarding licensing and regulatory reform and improvement of the climate for nuclear investment.

Another near-term activity that is critical to the continued viability of nuclear power is the establishment of an effective nuclear waste management system. As you know, the past 10 years have witnessed a myriad of paper studies resulting in numerous policy and program redirections, but we have yet to demonstrate the ability to store and dispose of high-level nuclear waste. The lack of decisive action by the Federal Government has allowed this issue to develop into a problem of national concern.

Despite past indecision, several facts are clear. First, nuclear waste is a very real and present phenomenon. Second, we have available technically adequate means for handling this waste. And, third, the longer we allow political vacillations to delay the establishment of an effective waste management system, the greater will be the level of public concern.

In response to the President's call to break these chains of indecision, we have initiated an ambitious, results-oriented nuclear waste program. We are proposing more aggressive schedules for building a test and evaluation facility and for construction of the first licensed waste respository. We have in place a sound technology base--we must now make choices and take action. The number and scope of nuclear waste bills presently under consideration in the Congress indicates that this body, too, is determined that a safe, efficient system be operative as soon as possible.

We are closely monitoring the progress of nuclear waste legislation. One provision that we consider imperative is the establishment of a user-financed fund for major capital expenditures for waste management services, as recommended in our budget. Such a fund would allow those who are benefitting from the electricity generated by nuclear power to pay for the total costs associated with its production. It also would provide the program with the necessary resources to develop and operate repositories without competing for limited funds in the Federal budget. In exchange for upfront financing, we believe the legislation should provide that the Government will agree to assume responsibility for the utilities' spent fuel (or high-level waste when reprocessing is available) at some fixed future point.

In my opening remarks I stated that a fully integrated fuel cycle is essential to the complete realization of nuclear fission's potential. Along with other advanced nuclear countries, we recognize the benefits of reprocessing spent fuel and preserving access to this residual energy resource. Additional incentives for developing a domestic reprocessing capability include improved waste disposal characteristics, relief of the spent fuel storage congestion problem, and provision of the plutonium inventory required for breeder reactor demonstration and deployment.

We have been instructed by the President to identify regulatory barriers to commercial reprocessing and to develop recommendations on how to create a more favorable climate for private reprocessing efforts. In carrying out this directive, we have found not only regulatory barriers, but also a number of institutional and economic uncertainties that are impediments to commercial reprocessing. We expect to provide specific recommendations within the next several months for Government actions that will allow the private sector to move forward once again. We remain optimistic that if the Government does its part, the private sector can and will provide a domestic reprocessing service that will restore U.S. leadership, credibility and influence in this critical area.

The final element of an integrated fuel cycle and power generation system is the breeder reactor. The vast potential of the breeder concept was recognized in the mid-1940's by the early pioneers in nuclear fission research. It has been U.S. nuclear development policy from the outset to secure an economic and deployable breeder option for whenever it might be needed. The LWR, resting largely on technology inherited from the naval program, was deployed in the early 1960's and thus became an intermediate step to a breeder economy. It was planned that, ultimately, plutonium stockpiles from reprocessed LWR fuel and depleted tails from enrichment plant operation would launch a breeder economy. The implementation strategy that emerged over the years established a sequence of breeder reactor projects of increasing power rating as the central path of the U.S. breeder research and development program. This plant sequence would provide the organizing principle and schedule for all efforts in the program. Prior to 1977, when President Carter deferred breeder development and reprocessing, the planned project sequence was:

- o The Experimental Breeder Reactor (EBR-II)--on line in 1964;
- o Fast Flux Test Facility (FFTF)--scheduled to be on line in 1980;
- o Clinch River Breeder Reactor (CRBR)--scheduled to be on line in 1983;
- o A large prototype plant--scheduled to be on line in 1988.

The President, last October, recognized the importance that this breeder technology holds for our future energy security and directed the expeditious completion of the Clinch River Breeder Reactor Project. The approach we are using for CRBR employs not only a scaleup in plant size but a corresponding scaleup in major sodium system components. Research and development in generic breeder system technology, which provides necessary support to plant projects, completes the coordinated strategy. We believe strongly that this approach has invaluable implications for safety, plant reliability, and ultimate plant effectiveness. That industry agrees is evidenced by the significant commitment of 753 electrical utilities, grouped under the Breeder Reactor Corporation, in pledging $261 million to support design, construction, and operation of the Clinch River Reactor.

The decision 5 years ago to defer breeder demonstration has, of course, had a sever impact on CRBR. The effect of the policy debate during the Carter Administration has added approximately $850 million to the cost of the project. More than a day-for-a-day schedule slippage has occurred: in 1977, criticality was scheduled for 1983; at the beginning of the Reagan Administration last year, the reference criticality date was 1990. During my confirmation hearing I pledged to rebaseline CRBR with an aim toward streamlining the project and accelerating the schedule. In an effort to cut 18 months off of the front end of the schedule, we applied to NRC to begin site work and excavation this spring, rather than in the summer of 1983. However, NRC rejected our request on the basis that they believed that acceleration of the project was not in the public interest. We are currently assessing other means of accelerating the project schedule including trimming the construction time by resequencing construction tasks.

Although the CRBR deferral decision made it impossible to achieve many of our project milestones, efforts in areas not constrained produced notable results. As of January 1, over 90 percent of the research and development necessary to build CRBR had been completed, as had over 80 percent of the engineering; in addition, 60 percent of the required equipment had been received or was on order. The next step beyond the CRBR, construction of a large developmental plant, will be primarily the responsibility of the private sector.

A very important lesson that we learned from LWR commercialization is that development of reactor technology must be accompanied by development of supporting fuel cycle technology. This means that to support commercially deployable breeder reactors, we must also develop safe technology for the back end of the fuel cycle.

Accordingly, our fuel cycle R&D program is focused on developing breeder fuel fabrication and reprocessing as part of the overall breeder R&D program. The objective is to develop the technology to a stage that would represent an acceptable economic risk to the private sector. Ultimately, industry must make the choices and bear the responsibility for all aspects of commercial breeder deployment.

Resumption of a leadership role in advanced technologies such as the breeder and reprocessing will enhance our influence in international technical, political, and economic developments as well as our ability to influence world nonproliferation strategies. The availability of advanced technology coupled with renewed efforts to demonstrate the attractiveness of U.S. products on the world marketing scene should substantially increase our viability in foreign commerce.

A key element in our efforts to firmly establish the United States as a reliable supplier of nuclear fuel services is our Uranium Enrichment Program. As you know, the United States presently enriches uranium to the desired U-235 product assay levels in three gaseous diffusion plants located at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. To operate these plants efficiently, we have projected future enrichment requirements to determine the appropriate operating level to meet these requirements. These projections indicate that capacity beyond what is currently available in the gaseous diffusion complex will be required in the 1990's.

Based on the sound technological base which has been developed over the last 20 years, gaseous centrifuge technology is considered the most economical and efficient choice for producing this additional capacity in the required timeframe. In addition to providing separative work at a significantly lower cost than is currently possible, the centifuge process uses but one-twentieth of the energy that gaseous diffusion consumes. Consequently, we are constructing a Gas Centrifuge Enrichment Plant (GCEP) at Portsmouth, Ohio. Construction progress has been excellent. We are on schedule and the total estimated cost, adjusted for escalation, has remained constant.

The enrichment of uranium in the centrifuge plant will begin in 1988 with a capacity of 2.2 million SWU per year available in 1989. Additional production capacity will be added as demand for enrichment services warrants or as economics justify the substitution of gas centrifuge for the more energy-intensive gaseous diffusion. Full production from the 8-building plant is scheduled in 1994.

An advanced enrichment technology, the Advanced Isotope Separation (AIS) process, is being developed. AIS offers the potential advantage of further reductions in capital cost and energy consumption, but it does not enjoy the same technological base as the centrifuge option. When successfully developed, the AIS process could provide new enrichment capacity in the mid-to-late 1990's. Selection of a single process for engineering development from among the three candidate processes will occur in FY 1982 and progress toward a development/demonstration module will continue in FY 1983.

As you know, revenues are received from the sales of enrichment services to domestic and foreign customers. For FY 1983, we estimate these to be over $2 billion. These revenues will more than offset the requirement for appropriations to cover our enrichment activities.

Based on the viability of our operations, there have been suggestions over the years that enrichment activities be transferred to the private sector. We are currently evaluating that option and identifying appropriate procedures should a decision be made to transfer enrichment activities to private industry.

Mr. Chairman, if I have conveyed but one message in my foregoing remarks, I hope it is that we do not have business-as-usual programs. We feel that our goals are ambitious but realistic. With the help of Congress, we believe that our programs can make substantial contributions to the safe, efficient generation of nuclear-powered electricity. We do not foresee at this time that our programs would be substantially affected by the President's reorganization proposal.

I would now like to review in some detail the objectives, strategies, and status of the Breeder Reactor Programs.

## BREEDER REACTOR SYSTEMS

Before discussing the details of the breeder reactor systems program and supporting projects, we need to understand the underlying reasons why the breeder is important to this Nation and why it is important for the Government to support its development.

This Nation needs a breeder reactor industrial capability to meet a growing demand for electricity. The breeder reactor can provide less environmental impact than current generation light water reactors (LWRs). It may be the most economical technology for supplying electricity when it reaches technical maturity, and it could become a valuable source of foreign trade benefits. A Federal role is necessary because the costs and risks of development are higher than the private sector can bear, and the benefits are capturable only over a long period of time. The Nation's breeder program has benefited from over 30 years of successful research, development and demonstration support. The achievements are part of a natural progression in size and complexity that we expect will lead to decisions by the private sector on breeder industrialization and deployment.

Unlike insecure foreign oil, breeder fuel, in the form of enrichment plant tails, is already stockpiled, and currently consists of about 260,000 metric tons of uranium. If used in fast breeder reactors, this quantity is sufficient to generate enough electricity to supply the entire United States (at the current rate of demand) for over 700 years. The plutonium required would be obtainable, initially, from reprocessing spent fuel that has already been discharged from light water reactors and, later, from reprocessed breeder reactor fuel.

Recent improvements in energy efficiency, due to conservation and improvements in technology, imply energy growth at a lower rate than has historically been experienced. Nonetheless, it is likely that the historical trends of rising GNP and energy consumption will continue.

Electric energy is more closely coupled to GNP than total energy and accounts for over 10 percent of total energy consumption now. EIA predicts that by the end of the century electricity will account for 17 percent of total energy consumption. Thus, much of the future economic growth will be fueled by increased production of electricity. While national electrical growth rates have decreased from historic high levels, some utilities, such as in the Southwest, are experiencing annual electrical growth rates approaching 6 percent and more. Additionally, new plants will be needed to replace aging facilities and plants that are no longer economic to operate.

Geothermal, solar electric, low-head hydro, and windmills can supply electricity for unique, small-scale applications; but of all the alternatives for electricity production, only coal and uranium offer the potential for economic generation of adequate energy supplies in the foreseeable future. Nuclear energy currently supplies 12 percent of our domestic electrical requirements; with plants being constructed now, nuclear's contribution will grow to 19 percent by 1985 and to 22-25 percent by 1990.

Creating an essentially inexhaustible supply of energy from uranium requires extending the current nuclear technology design and developing the next generation breeder reactors. Continued deployment of current-generation light water reactor plants will ultimately be limited by the availability of economically recoverable uranium ore, currently expected to last between 30 and 50 years, depending on assumptions concerning uranium recovery, cost of production, and electric demand growth.

While other inexhaustible electrical energy sources, such as fusion and solar electric, may become available to compete on an economic, technical, and commercial basis with the breeder, the advanced state of fast breeder technology relative to fusion and solar make it the surest of the inexhaustible supply options. Additionally, continued breeder development provides an important requisite to nuclear growth that will be needed in the near term. No one will be interested in investing in a technology which has no long range future--a future that only breeder reactors can now assure.

Uncertainties in electrical demand growth, uranium resource endowment and recovery cost, LWR plant costs, and other planning assumptions influence ultimate breeder benefits. Economically, breeder benefits derive mainly from low estimated fuel costs, especially due to the fact that enrichment would not be required, and from the relative insensitivity of fuel cycle costs to supply disruptions.

Environmental benefits would accrue from the elimination of mining, milling, and enrichment requirements needed for LWRs. Further, the breeder requires much less mining and transportation than coal-fired plants and would not release fossil-fuel emissions to the atmosphere.

While technological feasibility has been demonstrated in a number of small and intermediate size Liquid Metal Fast Breeder Reactors

(LMFBRs) built and operated in the United States and abroad, intensive work is required before this technology is established. Future LMFBR progress will rely on the successful development of critical components, operating experience with existing smaller plants, completion of the R&D tasks underway needed for engineering scale-up, and construction and operation of successively larger plants.

This LMFBR research, development, and demonstration program is a necessary but costly effort that requires many highly specialized facilities. Combined with the time required to complete the necessary technical work, this program is beyond the investment/time horizon of any domestic business venture. Due to its high short-term costs and business risks, the research and development can not be funded by the private sector alone.

Reasonable and prudent planning dictates that Federal involvement in LMFBR development be geared toward assuring our ability to deploy the breeder when needed. The consequences of early LMFBR development are minor compared to the risk of possible energy shortages and the increased vulnerability such shortages imply, and to the economic penalties in the form of higher priced electricity and possible loss of foreign sales associated with late development. Any further program delays may destroy the continuity that is essential to any high technology development program; a continuity that has helped propel the French and Japanese programs to the forefront of international competition.

National prestige is also important but is difficult to measure and quantify; it does, however, play an important role in policy decisions. This Nation's prestige, which is derived in large part from our ability to show leadership in all aspects of commercial nuclear technology, including the breeder reactor, provides us with a strong and necessary platform from which to more effectively negotiate nonproliferation goals.

The Federal role in the future of breeder reactors is to conduct the necessary research and development such that the potential benefits of the breeder can be captured by private industry at a venture risk level that is consistent with acceptable business endeavors. The responsibility for industrialization and deployment will rest with the private sector.

The goal of the breeder program is to ensure that this long-term electricity supply option is available on a prudent time scale. To accomplish this goal, the U.S. LMFBR program will develop the technical, engineering, safety, environmental, economic, licensing, and industrial data base required to transfer design, construction, and operation capabilities of future LMFBR powerplants to the private sector. The program consists of three broad elements: (1) construction and operation of CRBR, (2) a supporting base technology program, including test facility construction and operation, and (3) a supporting fuel cycle program. The LMFBR program draws upon experience of the water cooled breeder reactor technology development program.

The first two elements are closely integrated and are directed at breeder powerplant development, while the fuel cycle effort will provide the basis for integrating breeder reactors into an existing and expanded nuclear energy economy. A broader description of these elements follows.

Plant Development: To bring LMFBR technology to a point of acceptable commercial risk requires that it be advanced and confirmed by constructing and operating plants in increasing larger sizes. This approach was followed by the Atomic Energy Commission in cooperation with the electric utilities to achieve the successful commercialization of LWRs, and is being used by the major foreign breeder development programs. The LMFBR program has successfully constructed and operated the 20 MWe EBR-II and the 133 MWe equivalent Fast Flux Test Facility (FFTF).

The Agency is proceeding with the 375 MWe Clinch River Breeder Reactor Plant (CRBRP), and we are entering a new phase in which Government is encouraging construction of a large pre-commercial development plant to follow Clinch River. The pre-commercial plant will be principally funded by the private sector.

Base Technology: The role of base technology is to develop information necessary to reduce technical uncertainties to levels acceptable to private industry for further development in key technology areas. It is concentrated in the area of safety, physics, reactor control, coolant flow, heat transfer, and core and fuel development that are within existing Federal capability but beyond the capability of the private sector. The program has been modified to reflect reduced budget requests, and the increased role projected for the private sector in large plant demonstration projects. Specifically, we have consolidated a number of activities, eliminated contractor participation in certain areas, shut down some facilities, and reduced the work level across the board.

Test Facilities: Test facilities are provided to advance technology development through the proof test stage of components and systems critical to the success of reactors in the size range of interest to utilities. The operational objectives are to provide, maintain, and operate, including site support, essential breeder reactor program facilities to meet program requirements and schedules established by projects and other breeder technology elements. Test facility operations are being redirected, through shutting down the Engineering Test Reactor after completion of current tests, consolidation of all physics testing into the Zero Plutonium Power Reactor, and through broadening the role of the Fast Flux Test Facility (FFTF) towards operability and maintainability of the plant, in addition to its use as a fuel test facility.

**Fuel Cycle Program:** The fuel cycle program is closely coordinated with reactor and technology programs to assure that fuel cycle needs of the overall LMFBR program are met.

**Water Cooled Breeder:** The goal of this program is to develop technology for significantly improving the efficiency of nuclear fuel resource utilization by water cooled reactors.

A discussion of each nuclear reactor program follows. The budget request for the LMFBR program is summarized below:

| | (B/A $ in Millions) | |
|---|---|---|
| | FY 1982 | FY 1983 |
| CRBR | 193.9 | 252.5 |
| Large Developmental Plant | 15.0 | -- |
| LMFBR Base Program | 376.1 | 270.6 |
| Program Direction | 10.3 | 12.4 |

## CLINCH RIVER BREEDER REACTOR PLANT PROJECT

The next LMFBR plant in this deliberate sequence of plants of increased size is the Clinch River Breeder Reactor Plant (CRBRP). This 375 megawatt electric plant is a joint undertaking of the U.S. Government and 753 electric systems from the public, private, municipal, and cooperative sectors of the utility industry. Its size represents a technically significant yet prudent scale up in plant technology. The CRBRP is to be constructed in Oak Ridge, Tennessee, where it will be operated as part of the TVA electricity supply network. In addition to fulfilling its principle objective of advancing breeder technology, the plant will produce electrical power sufficient to meet the residential needs of 200,000 people.

The importance of this project is widely recognized. President Reagan in his October 8, 1981, policy statement on nuclear power stated that completion of the Clinch River plant is essential to ensure our preparedness for long-term nuclear power needs. The CRBRP will provide significant technical information from the results of the plant design, fabrication of plant components, safety, licensing, construction and plant operating experience. Congress has long recognized the importance of the CRBRP as evidenced by its continued support of the project through the years. Professional societies, labor, and other organizations have stated their support for the CRBRP. Included, among others, are the following organizations: the AFL-CIO, the Edison Electric Institute, the American Society of Professional Engineers, Scientists and Engineers for Secure Energy, and the American Association of Engineering Societies. Foreign support has also been received.

Many objections to the CRBRP rest on the assumption that the United States will not need a major new source of electricity. That assumption rests on often-cited claims that demand is decreasing, but demand for electricity has not decreased; rather it is increasing, albeit at a slower rate. Even the current relatively slow annual growth rate will require a doubling of the Nation's impressive 630,000 megawatts of generating capacity every 25-35 years.

The Clinch River design is up-to-date. The original design which was based on guidelines generated from a consensus of technical, industrial, and government groups, has been updated to reflect current regulatory requirements and new breeder developments in the United States and abroad. The current Clinch River design is therefore at the forefront of world breeder technology.

In spite of the delay over the last 5 years, substantial progress on this project has already been made. Plant design is approximately 90 percent complete. Most of the major equipment is either on order or has already been completed. Significant licensing progress is being made and preparation for site work is now under way. We have moved aggressively in response to the Administration's firm support for this project and the consistent intent of Congress as expressed in FY 1982 legislation, that this plant be completed as expeditiously as possible. I would like to highlight some of the important actions that we have taken.

The Nuclear Regulatory Commission's (NRC's) environmental and safety reviews of the project have been resumed and are currently proceeding very satisfactorily. It is expected that the NRC staff will complete its environmental review this fiscal year and complete its safety review in Fiscal Year 1983. These reviews will be followed by public hearings with the expectation that a construction permit will be issued in mid-1984. We are in a position to begin site preparation activities immediately upon receipt of NRC authorization. This authorization is expected no later than mid-FY 1983.

Other important initiatives which have been taken include improvements in the organizational structure of the project and in the contractual arrangements with our principal contractors, planned placement of a fixed price contract for plant steam generators, and the establishment of a schedule to bring the plant to criticality in the late 1980's. These actions will enable us to proceed effectively towards expeditious completion of this project.

Design and equipment fabrication will continue to progress towards completion. Design will be approximately 95 percent completed and virtually all drawings required for plant construction will be finished by the end of the year. We will continue to add to our already substantial inventory of completed hardware. Deliveries planned for FY 1983 include the polar and building service cranes, thermal insulation, thermal transient valves, and the protected air cooled condenser. We will also continue the fabrication of other equipment, including steam generators, pumps, and the ex-vessel transfer machine.

It is time to move with this project, which the Congress has supported so consistently. Much has been accomplished during the past year to pave the way for completing this project as soon as possible and our efforts will continue to focus on this objective. Success will require the continued support of Congress and appropriation of the full funding requested for Clinch River. With your support, we can begin to realize the benefits of successful operation of this advanced LMFBR plant.

## LARGE DEVELOPMENTAL PLANT

At present, breeder technology has been developed to a point where there is a substantial level of confidence that large LMFBR's can be successfully introduced when needed to meet future U.S. energy needs. However, technical and engineering uncertainties and the technical and economic risks of proceeding to the pre-commercial demonstration of a large breeder reactor at this time are unacceptably high for the private sector. The CRBRP and the breeder base technology program are directed at reducing these technical and engineering uncertainties to acceptable levels such that the private sector could undertake this next major step. This step is important in demonstrating the acceptability of these risks to private industry and will specifically require the design, construction, and operation of a large developmental breeder plant at near-commercial scale.

With regard to activities supporting a large developmental plant, DOE efforts are entering a new phase in which the Government will provide encouragement to a newly initiated utility activity to define the design, cost, schedule, and implementation plans for a developmental plant whose construction will be principally funded by the private sector. A major activity that will be undertaken in concert with the private sector is an effort to develop international participation in the project so as to minimize program costs and to allow maximum utilization of international technological advances.

If satisfactory progress is achieved in FY 1982 in development of cooperative arrangements with foreign nations and the private sector, continued Government support for this activity in FY 1983 will be provided.

In this light, the Large Developmental Plant (LDP) project is proceeding in fiscal year 1982 with the advanced conceptual design, preparation of detailed cost and schedule estimates, and the definition of the research and development required to support a large scale LMFBR plant. Highlights of this project during the last year include efforts to optimize the overall plant design and to reduce the estimated plant capital cost. Also, the design and research and development results of the Clinch River project and the breeder base program are being incorporated into the large plant advanced conceptual design.

Currently, as the LDP proceeds, we are attempting to develop the framework for beneficial cooperation in a large LMFBR plant project with the private sector and with various foreign countries. Progress in this area to date is very encouraging. If we can successfully achieve broad cooperation in a large plant project, the risks and costs of proceeding with the development of the breeder could be significantly reduced. Cooperative international arrangements also offer the potential for developing a sound basis for institutional fuel cycle arrangements needed to support the breeder.

## LIQUID METAL FAST BREEDER REACTOR BASE TECHNOLOGY PROGRAM

The role of this program is to establish a sound technology base to enable the private sector to proceed with industrialization and deployment of the LMFBR. The technology program has undergone some modifications to make possible a reduced FY 1983 budget request. To achieve the necessary economies we have consolidated a number of activities and eliminated contractor participation in certain areas. We also will shut down some facilities and reduce the work level across the board. Nevertheless, we believe that we still can manage the development of a sound technology base, although at a somewhat reduced pace and scope.

The private sector will make the determination when the LMFBR technology will be deployed, but such deployment will take place only when the industry feels that the Government has brought the technology to maturity.

The activities required to achieve that goal are:

- Continued operation of Breeder Reactors of increasing size to provide the necessary overall system interaction and performance experience.
- Development through the proof test stage of certain components critical to the success of reactors in the size range of interest to utilities.
- Generic research and development, within existing Federal capability, but beyond capability of the private sector. This research and testing will develop solutions and prove their performance for use in reactor design and operation. Research and development is required in the areas of safety phenomena required for the regulatory process, physics, and control performance for reactor core design, earthquake and natural hazard resistance, and verified engineering design tools in the flow, heat transfer, and structural areas appropriate to large scale plants, and core components including fuels.

I will now describe each technology area in detail:

## ENGINEERED SYSTEMS AND COMPONENTS

Engineered Systems and Components program encompasses the development of component technology to the point where the future economic and technical risks of designing, building and operating safe, reliable, and economic breeder reactor components are acceptable and can be undertaken by the private sector.

Experience with breeder reactor plants in this country (EBR-II and Fermi) and abroad (PFR, Phenix, BN-350, BN-600) has shown that heat-transport components have been the major source of plant operational deficiencies. Thus, development emphasis is on technology in support of unproven but essential components such as steam generators and main coolant pumps. Also, the requirements for components beyond CRBRP and FFTF are different and, in some cases, more severe necessitating significant additional technology development and testing. Supporting development in areas such as vibration and mixing are carried out to successfully complete component technology development.

Of the major components, the steam generator presents the most challenging problem. Demonstration of a proven technology base capable of assuring the availability of steam generators for future breeders has not yet been fully achieved, either in this country or abroad.

FY 1982 accomplishments in the Engineered Systems and Components program include:

o Assembly of the tube bundle of the single-wall tube model steam generator will be complete.

o Post-test examination of the double-wall tube, seven tube model will be complete.

o Assembly of the shell of the double-wall tube model steam generator will begin.

o Fabrication of the two-stage primary pump test unit will continue.

o Testing of the intermediate pump test unit shaft seal will be completed.

- Large leak sodium-water reaction testing and evaluation will be completed.

FY 1983 activities will be as follows:

- The final design analysis and fabrication of the single-wall tube helical coil steam generator model will be completed, and the model will be shipped to the Energy Technology Engineering Center (ETEC) for sodium testing.
- Fabrication of the two-stage primary pump test unit will be completed.
- Testing of acoustic leak detection systems during the CRBRP prototype steam generator test will be completed.

## FUELS

The Fuels program includes fuel system development and assurance of fuel supply for the LMFBR. Two major goals are pursued:

- Provide safe, reliable, long-lifetime cores for fast breeder reactors through development, testing and qualification of mixed oxide fuel, blanket, and absorber components and verification of performance analysis methods required for LMFBR core design. Development of such core components requires selective development of cladding and duct alloys that exhibit maximum stability in the breeder core environment.
- Develop an adequate fuel supply capability, to support the CRBRP, the FFTF, and future LMFBRs as required, that reduces personnel radiation exposure, enhances special nuclear material safeguards, and provides high quality, lower cost fuel.

Significant Fuels program accomplishments through FY 1982 include:

- Completion of successful testing of over 3000 fuel pins in the EBR-II operations. Over 400 of these fuel pins have been tested beyond their design lifetime.

- Completion of more than 50 mixed-oxide fuel pin transient tests for establishing overpower operating capability of reference FFTF/CRBRP fuel.

- Fabrication of four complete core loadings of high quality FFTF driver fuel pins.

- Development of the fuel fabrication processes and automated equipment required for integration into a remotely operated fuel fabrication line.

- Completion of the advanced conceptual and preliminary designs of the Secure Automated Fabrication (SAF) line. This line is designed to provide FFTF driver fuel while further developing and demonstrating technology to reduce personnel irradiation exposure, to enhance special nuclear materials safeguards (accountability and physical protection), and to improve fuel quality and cost.

Key Fuels accomplishments in FY 1983 will include:

- Qualification of the reference FFTF/CRBR mixed oxide fuel system through FFTF testing to burnup levels of approximately 60,000 MWD/T (goal burnup is 80,000 MWD/T) will be completed.

- Detailed engineering design supporting fully-integrated SAF line operation in the Fuels and Materials Examination Facility (FMEF) will be continued. Procurement of SAF line equipment will continue. Integration testing of specific subsystems will continue in preparation for initiation of system installation in FY 1984.

- Demonstration tests in EBR-II and TREAT of oxide fuel pins with 2-year lifetime capability will be completed.

- Testing of an oxide fuel system and related cladding and duct materials with a 2-year lifetime capability will be initiated in FFTF.

## MATERIALS AND STRUCTURES

Materials and Structures encompasses the development of design methods and criteria, materials properties data, and processes to establish an adequate technology base to support design, construction, and licensing of plant systems and components. Program products include data, design rules and technical guidelines as documented in reports, Nuclear Energy Standards, consensus standards, and the Nuclear Systems Materials Handbook. Planned accomplishments in FY 1982 in the Materials and Structures program include:

o Complete analysis of life test results for the CRBRP materials.

Planned accomplishments in FY 1983 include:

o Complete analysis of tests to confirm seismic design procedures for piping systems.

## SAFETY

The Safety program is directed to the public safety considerations associated with LMFBR's. The mission of the program has two elements: 1) providing an adequate data base for licensability and assessment of risk to the public, and 2) beneficially influencing safety design features of LMFBR's. The efforts lie in two main areas: 1) prevention of accidents and 2) mitigation of accident consequences.

Some elements of the program have been consolidated, reducing the number of contractors involved. Reductions have been made primarily by consolidation of activities in the in-pile experiments program in TREAT. This program provides essential data on behavior of fuel and coolant during postulated accidents. Work will continue on upgrading the TREAT reactor to provide essential improvements in safety testing capabilities. Additionally, a viable program of operational safety experiments will be maintained utilizing the EBR-II reactor facility.

The consolidated program activities are organized along Lines of Assurance (LOA's) as a technique of management and as a means for communication and introduction of risk concepts.

Safety R&D in LOA-1 involves demonstration of reactor system reliability in preventing the occurrence of accidental events requiring prompt reactor shutdown, and demonstration of highly reliable reactor shutdown and shutdown heat removal should such events occur. LOA-2 R&D aims to demonstrate that faults in the shutdown and shutdown heat removal systems, and local faults within the core itself, can be accommodated with only limited damage to the core.

Safety R&D in LOA's 3 and 4 covers investigation of the potential of hypothetical core-disruptive accidents (HCDA's) to damage reactor and containment structures, development of engineered systems to reduce potential releases of radioactive material from containment, and studies of the inherent attenuation of airborne radioactive materials.

Major Safety program accomplishments through FY 1982 include:

o Complete reliability assessment of LMFBR shutdown systems and shutdown heat removal system.

o Continue development of man-machine interface programs leading to improvements in LMFBR control room design.

o Continue development of self-actuated shutdown systems.

In FY 1983, activities will include:

o In the man-machine interface area, evaluation of the plant status and maintenance control system at FFTF will be continued, and progress in the development of transition control and safety function monitoring systems will be reported.

- Progress in the evaluation of the potential for internal fuel motion to effect reactor shutdown under extreme accident conditions will be reported. The report will summarize experiments and analyses already performed, and recommend further work, where necessary.
- A series of natural circulation tests in EBR-II will be initiated. These experiments will utilize specially instrumented in-core test assemblies to measure natural circulation performance under increasingly severe reactor shutdown transient conditions.

## PHYSICS

The Physics program provides analytical design capability and data needed for the development and operation of safe, efficient LMFBR plants. Analytical capabilities are provided in the form of computer codes for interpretation of physics experiments and application in LMFBR design. Physics data include cross sections, nuclear decay characteristics, and a wide range of integral spectral and spatial measurements in critical assemblies, shielding mockups, and operating reactors.

Major Physics program accomplishments through FY 1982 are:

- Analyses of critical experiment mockups of CRBR sized heterogeneous cores, including fuel loading, power distribution, control worths, and detailed safety-related data.
- Analysis of major shielding requirements of a developmental LMFBR.

FY 1983 planned Physics accomplishments include:

- Apply sensitivity analysis and analyze benchmark measurements of FFTF fuel burnup to improve the design data base and fuel management capability for CRBRP.

- Complete preliminary evaluations of space dependent kinetic effects and perform benchmark critical experiments on Zero Power Plutonium Reactor (ZPPR) to improve understanding of physics performance of heterogeneous cores.
- Continue FBR assessments program to treat power and reaction rate distributions and Doppler reactivity effects. Incorporate results of assessments program into data files for FBR analysis.
- Perform shielding analyses to confirm performance, cost, weight savings for advanced in-vessel shields.
- Continue analysis of the reactivity effects associated with mechanical and thermal hydraulic design features of FBR's incorporating data from operating plants.

## TEST FACILITIES

The major objectives of the Test Facilities effort are to provide, maintain, and operate, including site support, essential breeder reactor program facilities at Hanford Engineering Development Laboratory (HEDL), Argonne National Laboratory (ANL), and Energy Technology Engineering Center (ETEC) to meet program requirements and schedules established by projects and other breeder technology elements. In compliance with DOE safeguards policies, our operating budget request includes safeguarding of special nuclear materials at ANL-West and our apportioned share of direct safeguards support at both ANL-East and HEDL. Additionally, construction of a safeguards assessment capability at ANL-West is planned to begin in FY 1983. Supporting technical services for our program assurance function are also provided, including technical assistance in quality assurance, nuclear assessment and engineering standards. In addition, our budget request contains the requirements necessary to assure continued safe and efficient operation of the Advanced Test Reactor at Idaho National

Engineering Laboratory (INEL) in support of the Naval Reactors program. In meeting these objectives experience in design, prototype testing, construction, operation, and maintenance is provided to plant projects and base technology. Thus a proven baseline for scaling up systems and components is established.

Several significant changes are included in our proposed budget for the Test Facilities effort. First, the focus of the Fast Flux Test Facility (FFTF) operation will shift toward demonstration of the operability and maintainability of a 400 MWt breeder reactor plant. This change in emphasis combined with FFTF achieving routine operations, accounts for the reduction in operating costs for this key facility. Second, we are not requesting any additional budget authority for Fuels and Materials Examination Facility (FMEF) in FY 1983. The FMEF will be completed with provisions for the Secure Automated Fabrication (SAF) line but activities associated with post-irradiation examination (PIE) capability will be deferred. PIE needs currently projected can be accommodated within existing facilities located at HEDL and ANL-West. Third, following completion of the series of the Sodium Loop Safety Facility (SLSF) tests in the Engineering Test Reactor (ETR) in December 1981, efforts were immediately undertaken to insure that activities required to place the ETR into an inactive standby status would be completed in FY 1982. This replaces previous plans to complete this activity in FY 1983 and results in a cost reduction of $3 million for the overall activity. Fourth, steps have been taken to consolidate all physics testing efforts into the Zero Plutonium Power Reactor (ZPPR) and to place several of the smaller ETEC component test facilities on standby.

The Test Facility objectives will be achieved with continued use of cost and schedule control systems and award fee type contracts as applicable to assure contractor performance meets major milestones and efficient use of funds. Where essential services can be performed by industry, maximum use of these industrial services are made in order to continue appropriate industrial support and minimize future disruptive perturbations in laboratory manpower.

## WATER COOLED BREEDER

| | FY 1982 | FY 1983 |
|---|---|---|
| Water Cooled Breeder | 52.0 | 42.0 |

The Water Cooled Breeder program's mission is to develop technology for significantly improving the efficiency of nuclear fuel resource utilization by water cooled nuclear reactors used for electrical power generation. The concept being demonstrated is a self-sustaining breeder reactor, cooled and moderated with ordinary (light) water and fueled with uranium-233 and thorium. Successful confirmation of breeding in the Shippingport Light Water Breeder Reactor core will provide the basic technology which would make available for power production about 50 percent of the energy in the Nation's thorium reserves, a source of energy many times greater than the known fossil fuel reserves. This concept is the only known approach using the proven technology of the light water reactor system for increasing fuel utilization efficiency significantly beyond the approximately one percent achievable with present types of light water thermal reactors. The subprograms within the Water Cooled Breeder program in FY 1983 will be: Shippingport Atomic Power Station (SAPS) and Light Water Breeder Reactor (LWBR).

### Shippingport Atomic Power Station

The Shippingport Atomic Power Station subprogram's objective is to advance pressurized water reactor technology through testing of advanced reactor concepts. The experience gained from operating the Shippingport Atomic Power Station, the first commercial nuclear reactor power station in the United States, provided the basis for much of the technology leading to present central station light water nuclear powerplants.

The operation of the Light Water Breeder core in the Shippingport plant is an extension of the development work that has been carried out at this facility since its initial operation in 1957. Since start-up, the Light Water Breeder core has performed successfully in both sustained operation at high power and periodic swing-load operations during which reactor power has been varied to meet power load demands. The Light Water Breeder core was released for routine operation to supply power to the Duquesne Light Company distribution system on December 2, 1977. As of December 2, 1981, the core had accumulated more than 24,300 effective full power hours and continues to provide valuable test data.

In October 1982, the Shippingport plant will cease routine power operation with the Light Water Breeder core and end-of-life testing and reactor defueling will begin. Completion of this effort will take approximately two years. The end-of-life testing includes core physics and engineering tests to provide data to use as a reference point in the end-of-life examination at the Naval Reactors Expended Core Facility (ECF). Efforts associated with the defueling process in FY 1983 include: maintaining the necessary plant conditions to conduct the defueling; removing interferences, external head components, and closure head studs; and disposal of removed LWBR components, except for spent fuel. The Shippingport plant will continue to be maintained for the period necessary to complete defueling and shipment of the spent fuel. Upon completion of spent fuel module shipments, the Shippingport Atomic Power Station will be turned over to the Agency's Office of Nuclear Waste Management and Fuel Cycle Programs for decommissioning activities.

Assessment and disposal of components removed from the Shippingport reactor vessel prior to installing the Light Water Breeder core will continue. This includes shipment of the remaining components from Shippingport, and completion of the lower core barrel shipping container.

## Light Water Breeder Reactor

The Light Water Breeder Reactor (LWBR) subprogram's objective is to accomplish the following: prove that breeding can be achieved in a light water nuclear reactor using the uranium-233/thorium fuel system; confirm a practical way to use thorium, a plentiful source of fuel for which there has been no major energy-related use; show the feasibility of installing prebreeder and breeder cores of the LWBR type in existing and future pressurized water reactor plants using existing types of plant components and systems; and make the technology developed under the program available to commercial industry. Another technical benefit of this program is the significant improvement in the efficiency of using nuclear fuel resources that is expected to be realized from LWBR technology.

Subsequent to defueling the Shippingport LWBR the spent fuel modules will be shipped to the ECF for a detailed core examination to verify core performance. Core examination is expected to take three-to-four years. If these examinations confirm that the LWBR core performed satisfactorily and bred as predicted, the basic reactor technology will have been established that could make available for power production about 50 percent of the energy potentially available in thorium reserves.

During FY 1983, work conducted under the Light Water Breeder Reactor subprogram will include: conducting end-of-life testing; disassembling fuel modules; shipping spent fuel; and preparing for core examinations. Specific efforts to be carried out include: conducting comprehensive physics and engineering tests to characterize the LWBR core at the end of its life; completing defueling equipment receipt and checkout; training of laboratory personnel for all phases of defueling and shipping; training personnel at ECF to receive the spent fuel, disassemble fuel assemblies, perform core examinations, and nondestructively assay fuel rods; cutting closure head seal welds; disconnecting and removing the suspended fuel modules from the reactor vessel head; partially disassembling fuel modules at Shippingport and initiating shipment of the spent fuel; and receiving and commencing fuel disassembly at ECF.

## CONVERTER REACTOR SYSTEMS

The overall objective of the Converter Reactor Systems program is to enhance the utilization of domestic energy resources. This program will consist of three major elements: Light Water Reactor Systems, Three Mile Island Activities, and Program Direction.

The total funding request for Converter Reactor Systems in FY 1983 is $32.0 million compared to $96.3 million in FY 1982. This request is broken down by program element as follows:

| | (B/A in Millions) | |
|---|---|---|
| | FY 1982 | FY 1983 |
| Light Water Reactor Systems | 22.7 | 4.0 |
| Three Mile Island Activities | 32.8 | 27.0 |
| Advanced Reactor Systems | 4.1 | 0 |
| High Temperature Reactors | 35.3 | 0 |
| Program Direction | 1.4 | 1.0 |

### Light Water Reactor (LWR) Systems

When electric demand dictates, additional nuclear capacity will be sought provided that institutional and financial obstacles are overcome. These obstacles are difficulties in capital formation by utilities, instability of regulatory process, and public perception of nuclear power. Certainly, there is no intrinsic reason why it should take between 10 and 15 years to bring nuclear plants into operation in the United States, when plants in France and Japan can be licensed and constructed in about 5-7 years. One correctable reason this condition exists in the United States is the uncertainty that a utility must face throughout the entire regulatory process, including the construction period and even after plant operation begins. The utilities and their investors simply cannot cope with the resulting uncertainty and significant costs over a 10-15 year time period. In addition, it impacts the public's confidence in perceptions in the ability to provide reliable, economic, and safe nuclear power. The Vice President's Task Force on Regulatory Reform offers an opportunity to correct much of this problem.

The general problem facing the utilities related to formation of capital for projects which offer lower life-cycle energy costs is not unique to the nuclear industry; it also impacts other capital intensive options such as coal. Allowed or realized rates of return are simply not commensurate with utility needs for capital to build new plants. At issue is the financial viability of the electric utilities--an issue which goes to the heart of our economic security. The President's Economic Recovery Plan and his regulatory reform objectives strive to create an investment environment more favorable to utility capital formation. Supporting the Administration's efforts, the goals of the Agency are:

- o Develop the necessary information supporting the Vice President's Task Force on Regulatory Reform.
- o Make available Agency facilities to conduct safety research needed to improve overall safety and to reduce costly nonproductive requirements.
- o Provide information and impetus to industry efforts to improve design, manufacturing, construction, and testing practices.

- Serve as the Administration's focal point for the support of nuclear power developments; provide factual information to the industry, financial community, and the general public.

- Gather information, perform R&D, and provide technology support to achieve safe and more expeditious Three Mile Island recovery as appropriate to the public interest.

Two major subprograms in Light Water Reactor Systems are LWR Safety and LWR Extended Burnup.

LWR Safety

The objective of the LWR Safety Subprogram is to formulate, coordinate, and conduct R&D to improve reactor safety and support revitalization of the LWR energy option. To achieve this objective, the Department will coordinate the development and implementation of a DOE/NRC/Industry cooperative program that:

A. Defines the institutional and technological issues of priority in achieving these goals; and

B. Identifies the efforts required to resolve these issues.

In response to Presidential and Congressional mandates, including Public Law 96-567 (Nuclear Safety Research, Development, and Demonstration Act of 1980) and to meet the objectives of the Agency program, a comprehensive LWR Safety program, in cooperation with industry, NRC, national laboratories, other Government agencies, and foreign programs, is being conducted. A key effort in this program is the development of a systematic and integrated approach to LWR safety.

As discussed in our response to Congress relative to Public Law 96-567, this program is divided into two phases--a program definition phase and a program implementation phase. In order to define program needs and priorities we are utilizing working groups composed of representatives from DOE, NRC, industry, and national laboratories to assist the Agency in both the program definition and program implementation phases. The Agency has convened 10 of these working groups and their membership and schedule of activities have been provided to Congress in our response to Public Law 96-567.

Major accomplishments in FY 1982 will include:

- Submittal of the three specific studies required by Public Law 96-567 to the Congress by the Secretary on January 29, 1982.
  - A Comprehensive Program Management Plan.
  - A study of the need and feasibility of a National Reactor Engineering Simulator.
  - A study of the sufficiency of U.S. efforts to provide specially trained operators for nuclear plants.
- Completion of development of regulatory reform recommendations.
- Completion of restructuring of the program to meet the program's objectives and thereby be compatible with the needs of NRC and the industry.

The restructured LWR Safety Subprogram supports the goal of improving safety and revitalizing the LWR industry through the following planned activities in Fiscal Year 1983:

1. coordinate and maintain the comprehensive LWR Safety program plan as directed in Public Law 96-567.
2. complete efforts to identify and prioritize safety research requirements.
3. continue efforts to reduce unnecessary technical regulatory burdens.

LWR Extended Burnup

The principal purpose in extending the burnup of LWR fuel is to reduce the generation rate of spent fuel and thereby reduce spent fuel storage and reprocessing requirements. Extended burnup can improve fuel cycle economics and the utilization of uranium resources.

The accomplishments of this subprogram to date have included proof of the capability of LWR fuel to achieve excellent extensions of burnup. Fuel from each of the five U.S. fuel vendors, equivalent to twenty-two fuel assemblies, has been irradiated in seven commercial light water reactors, and selected assemblies have achieved burnups up to 47,000 megawatt-days per ton (MWd/t), a value representing almost two-thirds of the burnup extension being sought. Advanced high burnup fuels designed to achieve the full program goal burnup extensions have been fabricated, and their irradiation has been initiated in two commercial reactors. The Duke Power Company has ordered reload fuel of moderately extended burnup as a direct result of this subprogram, and other utilities are evaluating similar orders. A pure zirconium lined cladding that is resistant to pellet-cladding interaction (PCI) failures, an issue that needs to be resolved prior to broad utility acceptance of burnup extensions, has been developed. Resolution of PCI also contributes significantly to improvement of fuel integrity, plant capacity factors, and of the load following capability of LWR's. A large-scale verification of this remedy, using 144 assemblies incorporating the remedy cladding, has been initiated in a commercial light water reactor.

In prior years, the overall strategy for this subprogram (formerly called uranium utilization) had been to accomplish LWR fuel improvements through multiple cost-shared projects with industry aimed at the development and in-plant verification of the improved technology. This strategy had enhanced and accelerated the level of R&D, had encouraged commercial demonstration and utilization of improved technologies, and had kept the Federal role and cost low. These efforts involved eleven electric utilities, all five nuclear fuel fabricators, two utility-supported organizations sponsoring research and development, and a larger number of European and Japanese organizations.

In FY 1983 the subprogram will be focused to include proving the performance of a single extended burnup fuel design up to established goal burnups, obtaining licensing data to support that and other extended burnup design, and developing other necessary supporting technology. This focusing will result in a single utility/fuel fabricator team becoming the principal contractor for the subprogram. Others in the industry may then follow in extended burnup development and implementation through the natural competitive forces of the marketplace. Technology development and licensing data needs in support of extended burnup are emphasizing PCI remedies and fission gas release data. Of two major contracts for verifying PCI remedies, one will be completed. Several internationally sponsored projects to which we are contributing moderate percentages of their cost are obtaining fission gas release data needed in support of extended burnup fuel design, are determining the PCI-related performance of current and improved fuel designs, and are verifying the capability of extended burnup fuel to accommodate licensing-basis transients.

## Three Mile Island (TMI) Activities

The overall goal of the Agency's Three Mile Island activities has been to develop and improve measures for enhancing safety and reliability of nuclear powerplants and to improve the capability to decontaminate nuclear powerplants. To accomplish this goal, we are pursuing a program of carefully examining and evaluating the TMI-2 accident and the response of the nuclear powerplant components and systems to accidents.

In consonance with the Administration's policy of placing responsibility for commercial nuclear power activities in the private sector, the Agency's TMI program is limited to necessary research and development only. Although responsibility for the costs of TMI cleanup is with the owner, the General Public Utilities (GPU) Company, some of the Agency's TMI research activities in FY 1983, such as in-situ inspection of the reactor core, are expected to have indirect benefits to GPU and to offset some of their cleanup costs. Such activities will only be conducted if they offer the opportunity to obtain significant generic research information.

In accordance with a Memorandum of Understanding between the Agency and the Nuclear Regulatory Commission, the Agency will acquire radioactive waste from TMI for research and development, and disposal.

The TMI activity has two major program elements: (1) a TMI Reactor Evaluation and Waste Immobilization Program that was initiated in FY 1982 and (2) a TMI Data Acquisition Program that began in FY 1980.

Waste Immobilization and Reactor Evaluation

The objectives of this subprogram are: (1) to examine the TMI-2 reactor and core components and to conduct research and development associated with the reactor defueling to provide data for evaluation of licensing criteria and requirements, analysis of causes and consequences of accidents, and, improvement of the reliability of the design and operation of LWR's, and (2) to conduct research and development on immobilization of abnormal reactor waste products. The $17 million of the funding request to be applied to this program in FY 1983 will continue the efforts in both of these areas.

The waste management and immobilization activities will initially be focused on an effort to demonstrate the feasibility of vitrifying zeolite ion exchange materials. The program will have demonstrated this feasibility in FY 1982. In addition, the majority of the Submerged Demineralizer System liners and the EPICOR-II liners will be shipped from TMI to Government facilities for R&D purposes.

Beginning in FY 1983, this program will focus on other techniques for the treatment of abnormal wastes produced at TMI, including alternative immobilization concepts, confidence testing, and long term sample observation to provide a more extensive data base. The knowledge gained from this program will contribute substantially to the technology for processing and disposing of unique waste forms resulting from commercial nuclear powerplant abnormal operations and accidents.

The reactor evaluation activities include the examination, removal, and disposition of the reactor core and internals; the development of the special systems, equipment, facilities, and processes needed to accomplish these tasks; and the conduct of supporting onsite and offsite fuel examinations, tests, and evaluations. Through-the-head visual examination of accessible parts of the reactor upper internals and core will be accomplished prior to defueling.

In FY 1983 preparations will be made for reactor head and plenum removal and defueling. The purpose of this activity is to obtain data and information on the condition of the reactor core and other internal components, to conduct the development needed for a thorough examination, and to effectively complete the defueling in as low as practical radiation environment. In addition, it is planned to perform offsite examinations of the fuel and debris to characterize the accident effects.

The knowledge gained from this program will provide data required for evaluating present licensing criteria and requirements; developing future licensing criteria; assessing and developing computer models used to analyze the course and consequences of severe accidents and means to mitigate the effects of such accidents; and evaluating improvements to reactor design, operation, and maintenance.

### Data Acquisition Program

The objective of this subprogram is to obtain important R&D data that are of generic value to the safety of light water reactors.

This element of the TMI activities is being implemented in accordance with a Memorandum of Understanding signed by the Nuclear Regulatory Commission (NRC), Electric Power Research Institute (EPRI), and General Public Utilities (GPU). The efforts of GPU are aimed primarily at plant cleanup and recovery.

The Agency has developed a program work scope that will obtain information that would not normally be obtained from the cleanup efforts required. The Agency's program is being conducted to avoid delaying the GPU cleanup schedule.

The Agency and EPRI are sharing responsibility for portions of this R&D program scope. Specifically, the Agency is funding data gathering, research and development, and information transfer in the following major areas: instrumentation and electrical equipment survivability; behavior of radioactive products; data system and specimen archiving; and offsite fuel debris examination. EPRI has similar responsibility for mechanical and structural component reliability, pressure boundary characterization, and decontamination and dose reduction associated with the primary coolant system.

The Agency has established a Technical Integration Office at TMI to manage Government activities, with EG&G Idaho as lead contractor. The technical information being obtained is being provided to the nuclear industry and the NRC through means of reports and seminars.

Some of the recent accomplishments of this subprogram include:

1. Eight electrical instruments were removed from the containment and fifteen electrical components were tested in-situ. Failure modes and effects were assessed and generic design and installation changes were suggested. Several manufacturers of electrical instruments are modifying designs based on TMI program suggestions.
2. Over 400 radioactive samples were analyzed and an initial effort at a mass balance was undertaken.
3. More than 250 detailed photographs were taken in the containment as part of the effort to assess the damage in the reactor building. All vertical surfaces appear to have little or no damage. This assessment leads one to believe decontamination of these surfaces will not be a significant problem. Additional data characterizing the hydrogen burn has been obtained; this

provides significant input to an understanding of the hydrogen event. This should impact NRC rulemakings.

4. An EPICOR-II resin liner that was used to clean contaminated water in the TMI-2 auxiliary building was examined at Battelle Columbus Laboratory. The remaining 49 EPICOR-II liners will require gas venting prior to shipment due to combustible mixtures. EG&G has designed and fabricated a device to accomplish this operation based on data generated by the TMI program at Battelle.

5. A seminar was held with representatives of the United States and foreign nuclear utility industry to describe the status and results of the TMI program.

6. An effort to design and fabricate a high integrity container suitable for disposal of EPICOR-II resin liners was initiated.

The $10 million of the funding request to be applied to this program in FY 1983 will continue the data gathering activities previously described, focusing on additional examination of electrical equipment, radionuclide analysis of samples removed from containment, and developing fuel and core examination techniques.

The electrical equipment information will be used to upgrade qualification standards, regulatory guides, and operating and maintenance standards in order to improve operation of nuclear powerplants during transients. The data on radioactive samples will be valuable in assessing the existing models for fission product release that are used in nuclear powerplant licensing.

## ADVANCED NUCLEAR SYSTEMS

The Advanced Nuclear Systems program is responsible for the development and delivery of nuclear power sources for U.S. military and civilian space and terrestrial applications and is responsible for the assessment and maintenance of those nuclear energy sources consistent with the Agency's health and safety requirements. In FY 1983, the activities of the Advanced Nuclear Systems have been narrowed to the major program element dealing with space applications of nuclear power sources. The major undertaking will continue to be the development of the nuclear isotope power generators for use on the NASA Galileo spacecraft planned for launch in 1985, the NASA/European Space Agency (ESA) International Solar Polar spacecraft planned for launch in 1986, and the Space Reactor Technology program (SP-100), initiated in FY 1982 in cooperation with NASA. A previous major program element, Advanced Systems Evaluation, is being phased out to support overall efforts to reduce Federal budgets. Furthermore, beginning in FY 1982 responsibility for the terrestrial applications efforts on the Beneficial Uses of Radioisotopes has been transferred to Defense Waste Management.

The budget request for the Space Applications activity is shown in the following table:

| | (B/A in Millions) | |
|---|---|---|
| | FY 1982 | FY 1983 |
| Flight Systems Development | 10.9 | 14.2 |
| Flight Systems Support | 23.0 | 15.1 |
| Terrestrial Applications | 2.5 | 0 |
| Program Direction | 1.2 | 1.3 |

### Flight Systems Development

This subprogram element includes the design, development, fabrication, and assembly of the isotope space power converter subsystems for the NASA Galileo and NASA/ESA International Solar Polar spacecraft. The isotope qualification converter and several flight converters planned for shipment from General Electric, Valley Forge, Pennsylvania, to the Mound Facility, Miamisburg, Ohio, will be supported by this subprogram element throughout the flight acceptance and qualifiction levels of tests at Mound Facility. The Updated Safety Analysis Reports for both missions are planned to be published. We have initiated discussions with NASA to expand our reimbursable work to include the qualification and spare flight units.

As currently programmed, the Space Reactor Technology Program (SP-100) will be continued in collaboration with NASA. Coordination with NASA and DARPA is now underway with a view to establishing an expanded tri-agency program (DOE, NASA, and DOD) with the DOE as the lead agency responsible for technology and development of the space reactor subsystem. Experimental work to demonstrate the technology readiness of the reactor core heat pipe heat transfer system, material characterization and compatibility, irradiation component testing, and reactor control activities will be pursued. Current space reactor component attributes are targeted for a power system at the 100 kW(e) level in the 1800 kg to 2500 kg weight range. Overall system performance characteristics are aimed toward NASA and DOD missions in the 1990's.

Flight Systems Support

This subprogram element supports fuel form production, encapsulation, heat source component manufacturing and assembly, environmental testing of the fueled flight units, and the overall independent safety and safety testing activities. In FY 1983, a significant manufacturing and testing program must be pursued both to meet the tight delivery schedules and the rigorous quality and safety requirements of the program. Iridium blanks fabricated at the Oak Ridge National Laboratory will be provided to the Mound Facility where the iridium is formed into fuel capsule containers. The Savannah River Plant will manufacture 63-watt thermal pellets of plutonium-238 and encapsulate them into the iridium containers provided by the Mound Facility.

Graphitic heat source parts will be procured, fabricated, and assembled for final installation into the thermoelectric converter hardware by Mound Facility staff. Safety analyses and safety testing will be conducted on representative flight isotope hardware components to assess the safety margin of the system by the Los Alamos National Laboratory.

Certain ongoing activities will not be conducted beginning in FY 1983. The independent technical and quality assurance efforts, which support both the flight development and research work, will be phased out. Also, reduction of fuel form production and encapsulation operations at Savannah River Plant is under consideration, in addition to the reduction of assembly and testing operations of flight fueled units at the Mound Facility, and converter fabrication work at General Electric, Valley Forge, Pennsylvania. In addition, the advanced modular isotope generator technology program will not be continued.

We are aware of the House Science and Technology Committee's desire to have the user agencies, such as NASA, reimburse the Agency for hardware units, such as the qualification power unit and the flight spare unit. As you know, NASA currently plans to reimburse the Agency for all flight units delivered in the Galileo and Solar Polar programs. This is a departure from previous practice wherein the Agency provided the first flight unit and flight spare unit to NASA. NASA subsequently reimbursed the Agency for all follow-on units. As I previously indicated, we have initiated discussions with NASA as directed by the Congress.

## COMMERCIAL WASTE MANAGEMENT PROGRAM

The objective of the Commercial Waste Management Program is to plan, develop, and implement the technology and provide the facilities for terminal isolation necessary for the long-term management and disposal of high-level and transuranic radioactive wastes produced in the civilian sector primarily from the production of electricity. The budget request for FY 1983 is $80.5 million, (supplemented by borrowing authority of $185 million) as compared to $210 million in FY 1982. The $185 million in borrowing authority is necessary until utility fees are received to finance the project-specific waste management activities. The nuclear waste disposal fund, which must be established to hold either the $185 in borrowing authority or the utility fees, would be a self-sustaining business operation. Consequently, we believe it should be a public enterprise fund from which expenditures can be made without further appropriations. Subprogram elements include: Terminal Isolation, Waste Systems Technology, and the West Valley Demonstration Project.

- Terminal Isolation. This activity consists of generic research and development and project-specific efforts leading to the site selection, design, licensing, construction, and operation of high level waste repositories.

  The current overall program strategy is to identify three candidate geologic repository sites at which construction of exploratory shafts to depth will begin in CY 1983, to be completed by CY 1985. The three locations will likely be: in basalt flows on the Hanford Site; in welded volcanic tuff on the Nevada Test Site (NTS); and in a salt formation site to be determined in CY 1983. One of the three sites will be selected for the development of a Test and Evaluation (T&E) Facility, which will provide experience and verification of waste emplacement technology. This decision is currently scheduled for CY 1985. Parallel work on detailed site characterization, necessary before a decision can be made on determining the site or sites to be used for a full-scale licensed repository, will continue at all three sites. A license application for the first repository is scheduled to be submitted to NRC by 1988, with earliest operation estimated to begin in 1998. The repository would be capable of accepting spent fuel in addition to solidified high-level and transuranic waste.

I would now like to briefly describe our accomplishments and projected activities for FY 1982 and our proposed terminal isolation activities at the requested budget level for FY 1983.

At the $50.4 million requested funding level in FY 1983 for generic R&D, the terminal isolation program will continue the development of technologies, such as repository sealing, transportation; conceptual design studies of the T&E Facility, which will be initiated in FY 1982; and performance assessment modeling generic to the geologic media being investigated. Such activities are necessary to support repository design, licensing, construction, operation, and decommissioning. Cooperative activities with other countries will be maintained to foster developments and exchange technology on waste disposal. Related testing continues with Sweden, the Federal Republic of Germany, and Canada on a bilateral basis. Also included is the continued evaluation of the technical and environmental feasibility of subseabed disposal.

We are also requesting $185.0 million in borrowing authority to fund the project-specific activities in FY 1983 until utility fees are available. This funding will allow the construction of exploratory shafts in basalt at the Hanford

Site and in tuff at NTS to be initiated in CY 1983, and for land acquisition, design, and long-lead procurements leading to a late CY 1983 construction start of the exploratory shaft in salt at a site identified in CY 1983. Site characterization work at NTS will allow for an early FY 1983 decision on the site and horizon selection for the tuff exploratory shaft. The exploratory shaft location on the Hanford Site has been identified and confirmatory drilling of boreholes is now proceeding. The funding would also provide for a very limited continuation of a nationwide screening for additional sites necessary for a system of regionally-based repositories. Preliminary design of waste packages in salt, basalt, and tuff will be completed, and scale testing of these package systems will be initiated. Design studies of the T&E Facility will continue in FY 1983. Other site-specific technology development, such as repository designs for tuff, host rock thermal-mechanical modeling, and hard rock mining equipment development, will be conducted also in FY 1983.

o The Waste Systems Technology Program, with a FY 1983 funding request of $11.4 million, encompasses the following tasks:

Federal/State interactions

This task would provide funds in FY 1983 to allow potentially affected States to participate in the planning and implementation of the site qualification and selection program for mined geologic repositories. This participation is essential in facilitating an understanding at the State level of the issues associated with repository siting and in encouraging confidence that our program adequately addresses the issues.

Supporting studies and evaluations

This task supports the nuclear waste and fuel cycle program in the areas of collection and dissemination of information on international programs; the review of technical programs by the National Academy of Sciences; and the independent assessment of technical and institutional issues.

Low level waste technology

The objectives of this activity are to facilitate the establishment of a reliable system for treatment and disposal of commercial low-level waste (LLW), to facilitate the formation of regional compacts, to transfer improved technology to the private sector, and to foster cooperative technology development demonstrations with the States and industry. Assistance in the timely development of regional LLW disposal sites will include comprehensive planning and other support, the assessment of waste generation, waste treatment analyses, site screening and selection methodologies, characterization studies and the demonstration of improved technologies. The technical program will focus in FY 1983 on waste form and volume reduction processes, radionuclide migration, and disposal site stabilization.

o West Valley Demonstration Project. The objective of the West Valley Demonstration Project is to carry out a high-level radioactive waste solidification demonstration project at the Western New York Nuclear Service Center near West Valley, New York, under the provisions of Public Law 96-368, the "West Valley Demonstration Project Act." The project will demonstrate the technology for solidification and preparation for permanent disposal of approximately 600,000 gallons of high level wastes from nuclear fuel reprocessing. It will also provide experience in the decontamination and decommissioning of nuclear fuel cycle facilities and operational experience on the removal and handling of stored waste, and will demonstrate technologies for the decontamination and decommissioning of high-level waste storage tanks.

The removal of high level waste from the storage tanks at West Valley is made difficult by restricted access to the inside of the tanks. Cleanup is further impeded by the variable composition of the waste and a gridwork structure in the bottom of the tank that interrupts clear access of rinsing and pumping devices. One of the first activities will be to develop the tooling and sampling devices for working through the existing access openings and to characterize the waste and design a removal program. We expect that special techniques of manipulation and special tools for sluicing material from the bottom of the tank will be a part of the development required for the project.

The FY 1983 funding request for the project is $15.4 million. Activity will emphasize the establishment of the technical, cost, and schedule baselines for carrying out the project, and the operation, maintenance, and upgrading of the facilities at the West Valley Center. A high priority is being assigned to verification of waste solidification equipment and performance of the solidified waste product, design of the waste removal and processing systems, and decontamination of the facilities for reuse and subsequent final decommissioning.

On November 3, 1980, the Department of Energy and the State of New York signed a cooperative agreement establishing the framework for the implementation of the Project. In July 1981, the Department issued a draft environmental impact statement. Public hearings on the draft EIS and project were held in West Valley on September 26, 1981. The final statement and record of decision are scheduled to be issued this summer. On September 18, 1981, the Department and the State amended the cooperative agreement to resolve some ambiguities contained in the initial agreement. The resolution of these issues permits us to move forward in a cost-effective manner.

On September 23, 1981, the Department and the Nuclear Regulatory Commission (NRC) completed a Memorandum of Understanding as required by the Act. This agreement established arrangements for NRC review and consultation on Project activities, especially as they relate to plans for waste removal, solidification and preparation for disposal, as well as ultimate decontamination and decommissioning. NRC will also be consulted on waste forms, containers, safety analysis and other related reports, and will have access to the site to monitor project activities for the purpose of further assuring the public health and safety. On September 30, 1981, the NRC issued a license amendment to permit licensees to transfer possession of the West Valley facility to the Department. This transfer took place on February 25, 1982.

## NUCLEAR FUEL CYCLE PROGRAM

The Nuclear Fuel Cycle Program includes technology for the safe and economic closing of the back-end of the light water reactor (LWR) nuclear fuel cycle, R&D on the breeder fuel cycle, and the development of waste forms that would meet requirements for safe disposal in a geologic media. Additionally, the program includes the identification and elimination of technical and institutional impediments to commercial reprocessing. Since additional spent fuel storage capacity will be required prior to the availability of commercial reprocessing services, the Agency, industry and utilities will participate in joint demonstration programs leading to the licensing of alternative storage techniques to enhance existing capabilities. The Budget Request for this program is $59.3 million, as compared to $52.7 million in FY 1982. The subprogram elements include: Reprocessing Technology, Waste Treatment and Storage Technology, and Spent Fuel Technology.

- Reprocessing Technology

  The fuel reprocessing research and development program provides for technology development in commercial fuel reprocessing and recycle. Process improvements for light water reactor fuel reprocessing are being addressed as are the more stringent requirements associated with reprocessing fast breeder fuels. The technical program is focusing on the development and demonstration of reprocessing technology that will provide for reduced occupational exposure, improved environmental protection, enhanced operational safety and reliability, acceptable economics, and improved safeguards.

  In FY 1982, equipment will be installed and integrated into systems in the Remote Operations and Maintenance Demonstration (ROMD) section of the Integrated Equipment Test (IET) facility and tested for remote maintenance performance.

In FY 1983, the Integrated Process Demonstration (IPD) section of IET will be put into service. In addition, the IET will be completed for large-scale development and non-radioactive testing of reprocessing equipment and services. The modular shear will be completed and installed in ROMD as will the automatic in-cell samplers. Engineering development of remote maintenance equipment will continue. Efforts will also proceed on safeguards, spent fuel, plutonium and waste handling development at the Barnwell facility in South Carolina. Design studies of an advanced head-end facility colocated with an existing LWR reprocessing facility will continue.

- Waste Treatment and Storage Technology

  The program is directed toward the safe handling, treatment, and interim storage of fuel cycle wastes prior to their permanent disposal. A significant activity is the selection of a commercial waste form and process that the Federal Government would accept from a reprocessing operation. The Agency will continue work on transuranic waste management. Because management of transuranic and high level waste has similar needs and objectives, there will be close interaction and mutual support between the programs. Emphasis will be placed on the development of automated and remote operations for the higher radiation levels associated with commercial transuranic waste. The Agency will also initiate the conceptual design of a facility to provide interim storage of waste from reprocessing operations.

- Spent Fuel Technology

  Analyses indicate that utilities will require interim spent fuel storage capacity in addition to their present pool-type storage. While the Agency believes that this interim storage is the responsibility of the private sector, we also see the feasibility of Government assistance and support in the commercial application of alternative storage technologies. Our experience has indicated the interim storage needs of commercial reactors can best be met by technologies such as rod consolidation and dry storage in casks. Thus, we are working with utilities with near-term storage problems to explore methods of applying these technologies to their particular needs.

The Agency's role in these cooperative efforts is to support utility license applications for rod consolidation and dry cask storage. Accordingly, we will develop generic licensing information that can be used by all utilities; provide removable or reusable equipment, such as a temporary storage cask or fuel disassembly equipment, for use in licensed storage operations; and conduct unlicensed storage demonstrations at a Government site with utility supplied fuel and casks in support of Nuclear Regulatory Commission requirements.

The utilities are expected to provide the reactor site and spent fuel used in the licensed storage operations. In addition, the utilities and private industry would provide the site specific equipment, personnel, and licensing documentation required and also any transportation services that are required.

The Agency will begin licensed use of boiling water reactor (BWR) fuel disassembly and rod consolidation during FY 1983 through a cooperative agreement with the Tennessee Valley Authority. Licensed use of a storage-only cask, procured by the Agency in FY 1982, is planned to begin in FY 1983.

Except for data on storage of consolidated rods in casks, we feel that a sufficient data base exists today to pursue licensing of rod consolidation and dry storage technologies. We have issued a report in FY 1982 on the technological status, licensability, and economics of dry storage.

## THE REMEDIAL ACTION PROGRAM

The Remedial Action Program includes four subprograms for the elimination of residual radioactivity resulting from past nuclear operations at certain government-owned sites or at designated non-government sites. The Budget Request for the program in FY 1983 is $50.3 million as compared to $43.4 million in FY 1982.

### Formerly Utilized Sites Remedial Action Program (FUSRAP)

The FUSRAP Program covers radioactively contaminated sites that were formerly owned, controlled, or used by the Manhattan Engineer District and the Atomic Energy Commission. Sites included for remedial action under this program have been determined to be insufficiently decontaminated to meet current guidelines for unrestricted occupancy or use. At present, 21 sites have been identified as needing remedial action and another 14 sites as probably needing remedial action. DOE has authority for remedial action at 13 of these sites.

In FY 1982, the cleanup of 27 contaminated properties in the vicinity of the former Middlesex Sampling Plant site at Middlesex, New Jersey was completed and the waste was stored on the Agency-owned site. The final phase of this project is to clean up the site and dispose of all the wastes. Several disposal options are being studied including use of other Federal sites, establishing a new State-owned site, possibly in conjunction with a State or regional low level waste site, or disposal under EPA permit at an Atlantic ocean site. A decision on the disposal option is planned for FY 1983. During FY 1982, cleanup of a privately owned parcel of land adjacent to the Niagara Falls Storage Site (NFSS) at Lewiston, New York was completed and the waste was stored on the DOE-owned site. Planning and engineering for cleanup of several miles of contaminated ditches leading from the NFSS is underway and ditch cleanup will be started in FY 1982 and completed in FY 1983. A contaminated landfill at Norton, Massachusetts was fenced, preparatory to other remedial action that is being planned for FY 1983. Engineering and environmental studies will be completed in FY 1982 for the Bayo Canyon and Acid Pueblo sites at Los Alamos, New Mexico. Remedial action on these sites is to be completed in FY 1983. We have been trying to proceed with a research and development project to stabilize wastes at the St. Louis Airport Site in Missouri, but have been unable to reconcile the issue of long-term responsibility for the site with the city. Cleanup of an off-site area that is the Agency's responsibility will be initiated as soon as the issue of a disposal site is resolved. Preliminary engineering and environmental studies for remedial actions at the Middlesex, New Jersey municipal landfill and the Linde Air Products site at Tonawanda, New York will be completed in FY 1982. Preparations for disposal of the Middlesex wastes will be completed in FY 1983.

## Grand Junction Program

Under Public Law 92-314, Congress provided financial assistance to the State of Colorado to limit radiation exposure resulting from the use of uranium mill tailings for construction purposes at Grand Junction.

This Federal/State cooperative effort is conducted under contract to the Colorado Department of Health. The remedial action provides for removal of uranium mill tailings from the premises of about 740 structures where external gamma radiation or indoor radon daughter exposures exceed the Surgeon General's 1979 guidelines. Federal funds cover 75 percent of the program costs, with the State providing the balance.

The program had completed cleanup of approximately 430 of the sites by the end of FY 1981. In FY 1982 remedial actions will be completed for about 40 properties. In FY 1983 about 80 properties will be completed. The cleanup of remaining sites under the program is tentatively scheduled to be completed by 1985 and finally certified by 1987, but the pace of the program is currently dependent on the State of Colorado's providing its share of the funding.

## Uranium Mill Tailings Remedial Action Program (UMTRAP)

In November 1978, Congress enacted Public Law 95-604, the Uranium Mill Tailings Radiation Control Act of 1978, which provides for the cleanup and stabilization of uranium mill tailings at 24 non-Federally owned inactive uranium processing sites, which were used for the production of uranium for sale to the Federal Government, and at any nearby properties contaminated with material derived from the sites.

The program will be conducted under cooperative agreements between the Federal Government and the affected States or Indian tribes. Remedial action costs will be shared on a 90/10 basis with the affected States. The Federal Government will pay all of the costs in the case of the Indian tribes.

The current project schedule for work on each of the 24 processing sites is based on the promulgation of final Environmental Protection Agency (EPA) standards for this program, currently anticipated in June 1982. The schedule calls for completion of the program within 7 years following the promulgation of the EPA standards, as authorized by P.L. 95-604.

Nine sites have been given a high priority on the basis of their potential for radiological hazards to the public. They are: Canonsburg, Pennsylvania; Salt Lake City, Utah; Durango, Colorado; the Shiprock, New Mexico site at the Navajo Indian Reservation, two sites at Rifle, Colorado; Gunnison, Colorado; Grand Junction, Colorado; and Riverton, Wyoming. Remedial action on the first processing site is to begin in the first quarter of FY 1984.

Cooperative agreements have been executed with Pennsylvania, Utah, and Colorado. The agreement with Colorado embraces all nine of the sites within that State. A proposed cooperative agreement with which to open negotiations with the Navajo tribe has been drafted and is under review within the Agency.

In response to DOE's presentation of a model draft cooperative agreement to the State of Wyoming, Governor Herschler has expressed deep concerns relative to parts of the proposed agreement. We are arranging to discuss Wyoming's problems with the draft agreement with representatives of the State's Office of the Attorney General.

Cleanup of a seriously contaminated vicinity property, Salt Lake City Fire Station #1, was completed in December 1981 using the interim EPA standards issued for this purpose in April 1980. Plans are in place for starting work on a second group of vicinity properties in Salt Lake City, and on an initial group of properties in Canonsburg, Pennsylvania, in the spring of 1982, pending the issuance of standards by the EPA.

Accomplishments planned for the budget request of $23.2 million in FY 1983 include completion of NEPA documentation (EIS's or EA's) for 11 sites, completion of remedial action plans and some detailed engineering for the first four high priority sites, the continuation of remedial action at vicinity properties at Canonsburg and Salt Lake City, and start of vicinity property work at Durango and Rifle, Colorado.

### Surplus Facilities Management Program (SFMP)

The Agency owns approximately 500 surplus facilities that are radioactively contaminated. About 100 of these are from activities related to development of commercial nuclear energy and are the responsibility of the Assistant Secretary for Nuclear Energy. The other 400 facilities are from defense activities and are the responsibility of the Assistant Secretary for Defense Programs. The facilities include reactors, fuel processing plants, laboratory buildings, tanks, and disposal facilities at about 17 sites throughout the United States and Puerto Rico. The objective is to decontaminate these facilities in order to eliminate the potential for significant personnel exposure or spread of contamination and to permit other productive uses where possible.

In FY 1982, Remedial Actions will continue at the Mound facility in Miamisburg, Ohio. The Mound cleanup, a major project jointly supported by the Offices of Nuclear Energy and Defense Programs, extends through 1988. Decontamination and decommissioning (D&D) of the Sodium Reactor Experiment power demonstration reactors at Santa Susana, California, will be completed in FY 1982. Engineering and planning for D&D of four other facilities at this Agency-leased site will continue in FY 1983. Preliminary engineering and planning for the D&D of the Shippingport Atomic Power Station will be completed in FY 1982. A draft Environmental Impact Statement has been issued for comment and the final statement is to be issued by this spring. The operation of the Shippingport reactor is to be terminated at the end of FY 1982 and the turnover of the facility for D&D work is to occur about July 1984. Other D&D work to be accomplished in FY 1982 includes the Agency-funded plutonium fabrication facilities at the Westinghouse Advanced Reactor Development, and similar facilities at Argonne National Laboratory and the General Electric Advanced Fuel Laboratory in California. The D&D of the reactor facility at the Center for Energy and Environmental Research at Mayaquez, Puerto Rico, and two nuclear rocket test stands at the Nevada Test Site will be completed. Stabilization of the R-10 uranium residues at the Niagara Falls Storage Site will be initiated.

## URANIUM ENRICHMENT

The goal of the Uranium Enrichment Program is to meet domestic and foreign utility and United States Government requirements for uranium enrichment services in the most economical, reliable, safe and environmentally acceptable manner possible.

The FY 1983 budget for the Uranium Enrichment Program is shown in Chart 1 by major program component. The FY 1983 request is $1,967,046,000 for authorization and appropriation offset by $2,032,700,000 in projected revenues. FY 1983 excess revenues of $65,654,000 are to be carried over and used to offset FY 1984 requirements.

The Uranium Enrichment Program consists of three subprograms: (1) Uranium Enrichment Activities; (2) Advanced Isotope Separation, and (3) Uranium Resource Assessment.

## PROJECTION OF URANIUM ENRICHMENT REQUIREMENTS

The Office of Uranium Enrichment and Assessment periodically estimates the domestic and non-U.S. nuclear electric generating capacity that will be served by the United States uranium enrichment complex.

Our latest estimates made last summer projected online worldwide nuclear power capacity to be served by the United States to be 137 gigawatts in 1985, 182 gigawatts in 1990 and 226 gigawatts in 1995. Domestic nuclear power capacity in these totals are 90 gigawatts in 1985, 122 gigawatts in 1990, and 140 gigawatts in 1995. The forecast is based on reactors currently operating or under construction. Our total forecast estimate is lower than projected in last year's testimony by 7 gigawatts in 1985, 9 gigawatts in 1990 and 6 gigawatts in 1995. 1995. The reduced estimate reflects additional delays and/or cancellations of nuclear power construction.

## CHART 1

## URANIUM ENRICHMENT PROGRAM

| | Budget Authority (Dollars in Thousands) | |
|---|---|---|
| | FY 1982 | FY 1983 |
| Uranium Enrichment Activities | | |
| Gaseous Diffusion | | |
| Cascade Power ...................... | $ 802,000 | $ 904,000 |
| Other Operations and Support ...... | 228,892 | 315,250 |
| Total Gaseous Diffusion ......... | 1,030,892 | 1,219,250 |
| Gas Centrifuge | | |
| GCEP ............................... | 588,000 | 613,000 |
| Other Operations and Support ...... | 87,216 | 94,500 |
| Total Gas Centrifuge ............ | 675,216 | 707,500 |
| Program Direction .................... | 3,019 | 3,100 |
| Total Uranium Enrichment Activities .................... | $ 1,709,127 | $ 1,929,850 |
| Advanced Isotope Separation ......... | 85,711 | 34,196 |
| Uranium Resource Assessment ......... | 9,979 | 3,000 |
| Subtotal ........................ | 1,804,817 | 1,967,046 |
| Revenues ............................ | -1,830,200 | -2,032,700 |
| Revenues to be carried over to FY 1984 ........................... | 0 | 65,654 |
| Total, Uranium Enrichment Program ....................... | $ -25,383* | $ 0 |

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* The net FY 1982 appropriation, after revenues, is $1,000,000. The number shown reflects comparability adjustments.

Separative work requirements for these gigawatt projections are determined from near-term contract information and standardized boiling water and pressurized water reactor models in the longer term. The requirements also reflect the leadtime required for processing enriched uranium from the time of withdrawal from the enrichment plants and insertion into the reactor. In addition, separative work is required to support Government programs such as the Naval Reactor program and other defense programs. These requirements are provided to us by the appropriate program offices.

## LONG-TERM STRATEGY

A long-term enrichment production strategy is developed to meet these requirements after considering a wide range of supply options. The strategy is chosen after considering economics, operational risks, and the flexibilities that are available to respond to higher or lower demand levels. In the short term, the strategy is to lower the operating levels of the gaseous diffusion complex, requiring power purchases below existing contract levels, and reduce inventories of enriched uranium. Even though this will require the Agency to pay capacity charges to its power suppliers for power not purchased, it remains the most economical way to operate in the long term. In FY 1983, the complex will operate at the same power levels as in FY 1982. These levels represent an acceptable level of risk of equipment failures from prolonged operations below plant design levels.

The long-term strategy is to continue design and construction of the Gas Centrifuge Enrichment Plant (GCEP) at Portsmouth, Ohio. The GCEP will initially provide an additional 2.2 million separative work units (SWU) of capacity by 1989. Capacity will be added in increments as dictated by demand, with completion of the full GCEP (eight process buildings) currently projected for 1994. This is the same schedule as was presented in the FY 1982 budget. Also, the output of the gaseous diffusion plants will be reduced in the mid-1990's by replacing some of the gaseous diffusion production with the less costly GCEP production. An advanced isotope separation process may be available for production in the mid-1990's providing further cost reductions by replacing gaseous diffusion capacity.

## UNITED STATES COMPETITIVE POSITION

The current uranium enrichment market is highly competitive with a limited number of near-term sales opportunities, all of which are outside of the United States. The United States position in the non-United States market has declined from a 100 percent share in 1974 to about a 35 percent share today. A number of our foreign customers have switched from the United States to EURODIF, URENCO and the Soviet Union, and some new business has gone to these suppliers. Today we face competition in the international market from suppliers with the following enrichment capacities:

Foreign Suppliers of Uranium Enrichment Services and Their Enrichment Capacity

| Supplier | Capacity (Millions of SWU/Year) |
|---|---|
| USSR | 3 to 4 available for export now |
| URENCO | 0.6 operating; 2.0 committed; 3.0 possible by 1990 |
| EURODIF | 10.8 capacity, production will be at a lower level |
| JAPAN | 2.0 possible by 1990 |
| BRAZIL | no current capacity; 0.2 possible by 1985 |
| AUSTRALIA | 1.0 possible by 1995 and 3.3 in the year 2000 timeframe |

To date, the total value of sales lost by the United States to its competitors is nearly $1.5 billion. During FY 1981 alone, the United States lost three enrichment contracts worth about $800 million over the lifetime of the nuclear reactors involved. This continues to be of great concern to us and we must reverse this trend.

Price has become a very important sales consideration to enrichment customers and our competitors have met this need by offering price guarantees equal to or slightly less than the United States by pricing on an incremental basis. Our competitors' strategy has proven quite successful in weakening the United States greatest market advantage. Last year, the United States enjoyed a price advantage of $30 to $50 per SWU. Since then the United States price increased by $20, the competitors have reduced their price, and fluctuating exchange rates have further reduced our competitors' prices. Our competitors' strategy, which was the primary reason the United States lost the three contracts in FY 1981 noted previously, has placed them in a very strong position to capture new sales opportunities in Taiwan and Mexico worth more than $1.3 billion.

Our competitors' ability to offer contracts with price, quantity, and timing provisions tailored to meet individual customer preferences has also given them an edge. We are not able to offer contracts on this basis due to the nondiscriminatory requirements legislated in Section 161v of the Atomic Energy Act of 1954, as amended.

To meet this challenge, we have implemented an active marketing effort to effectively enhance the sales advantages of the United States uranium enrichment program. Specifically, the uranium enrichment program is taking steps to minimize the current and future selling price by reducing operating costs at the gaseous diffusion plants, constructing GCEP, and pursuing more advanced and economically attractive technologies.

These efforts are beginning to produce results. We have recently signed a letter of intent with Egypt for the sale of one new uranium enrichment contract (to cover a 1,000 megawatt nuclear reactor) and an increased sales commitment of an existing contract (from 660 megawatts to 960 megawatts). From this action, we expect to realize about $20 million in additional annual revenues starting in the early 1990's, with a lifetime sales value in excess of $500 million.

Improvement in the United States marketing posture is expected to improve the probability of obtaining new sales in Taiwan, Switzerland, Mexico, Egypt and Yugoslavia. These sales are estimated to be worth more than $70 million in annual revenues starting in the early 1990's.

By maintaining and expanding our sales base, the United States will continue to realize significant benefits in terms of domestic employment, balance of payments and contribution to nuclear policies abroad.

## URANIUM ENRICHMENT ACTIVITIES

The budget for Uranium Enrichment Activities as shown in Chart 1 is described in two major program activities: (1) Gaseous Diffusion and (2) Gas Centrifuge.

## GASEOUS DIFFUSION

The United States presently enriches uranium to the desired U-235 product assay levels in its gaseous diffusion plants located at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. In these plants, the United States enriches customer-provided natural uranium in the U-235 component for a fee which recovers the cost of providing the services.

As indicated on Chart 1, $1,219,250,000 is requested for operation of the gaseous diffusion complex. The three gaseous diffusion plants will operate at a power level of 2,660 megawatts in FY 1983 and produce about 9.8 million SWU. The FY 1983 operating level is consistent with long-term enrichment strategy and represents an acceptable risk of process equipment failures from prolonged operations below plant design levels.

The 2,660 megawatt power level is substantially below the 4,548 megawatts we are contractually committed to purchase under existing contracts with the three power suppliers. Consequently, we are contractually required to pay about $151,000,000 (Tennessee Valley Authority (TVA)--$129,000,000, and Ohio Valley Electric Company (OVEC)--$22,000,000) in capacity charge payments in FY 1983 for power under contract that will not be purchased. If the Agency purchased power at the contractually committed level of 4,548 megawatts, the power budget would be increased by $394,000,000 from $904,000,000 to $1,298,000,000.

We are continuing discussions with the power suppliers in an attempt to reduce the capacity charge payments for power not purchased. As in the past, the success of these negotiations depends on the ability of our power suppliers to transfer contract power not purchased by the Agency to other customers. Relief from OVEC for FY 1983 is heavily contingent upon the level of economic activity in the Midwest. Relief from TVA is unlikely at this time because of the surplus generating capacity within TVA's own system, as well as within neighboring systems.

The total FY 1983 cascade power budget, including $151,000,000 in capacity charges, is $904,000,000. This is an increase of $102,000,000 over the FY 1982 budget and represents increases in the cost of power purchased due to higher coal costs and increased capacity charges for power not purchased.

Funding requested for diffusion operations, process and long range technical support, supporting services, capital equipment and construction is $315,250,000. The major increases over the FY 1982 budget are for common use stores and miscellaneous revenue expenses that were previously budgeted in the Agency's administration appropriation, and for escalation of costs. On a comparable basis and assuming an 8 percent cost escalation, the FY 1983 budget request is actually less than the FY 1982 budget. This reduction is the result of a deliberate effort by the Office of Uranium Enrichment and Assessment to minimize costs. In turn, SWU price increases will also be minimized. The requested funds are the minimum amounts needed to operate the plants; to replace equipment that has exceeded its useful life; to properly maintain the plants; and to comply with environmental and safety standards.

## GAS CENTRIFUGE

The FY 1983 budget request contains $613,000,000 for the construction of the Gas Centrifuge Enrichment Plant (GCEP) and $94,500,000 for other centrifuge activities.

The GCEP will provide an additional 2.2 million SWU per year of capacity by 1989. This GCEP capacity can be further increased to 3.3 million SWU per year through retrofit with advanced gas centrifuge machines now in development. Utilizing advanced centrifuge machines, GCEP will be completed by adding capacity in blocks of 1.65 million SWU sequentially as dictated by demand up to a total of 13.2 million SWU per year. Completion of the full GCEP is currently projected for 1994. This is the same schedule as was presented in the FY 1982 budget.

The construction of GCEP, authorized in FY 1976, provides the only legal basis for reopening the United States order books. In addition, GCEP represents the only additional technology which has demonstrated a production reliability sufficient to guarantee that the U.S. can, in fact, meet additional sales commitments from new contracts. This ability to contract with the foreign and domestic utilities is necessary to maintain a United States position as a major world supplier of uranium enrichment services.

Projections of the long-term United States uranium enrichment market share show that additional capacity is needed to meet demand in the 1990's. Strategic analyses indicate that GCEP should be used to meet this demand because GCEP provides the most economical, currently available means of supplying enrichment services. The GCEP is expected to produce separative work at a lower cost than gaseous diffusion production. This will lower the price of enrichment services which will lower the total cost of enriched uranium for customers. Lowered prices, in turn, will improve the United States competitive position in the international marketplace. The availability of GCEP also provides the opportunity to displace more costly gaseous diffusion production.

Our analysis also shows that the incremental cost of completing the full eight-process-building plant is cost competitive with the advanced isotope separation processes when an adjustment is made to reflect the uncertainties of the advanced processes. If successful, an advanced isotope separation process will provide an alternative for lower cost production in future plants and further displacement of the gaseous diffusion plants.

GCEP is making excellent progress and is on schedule with the total estimated cost (adjusted for escalation) holding constant. Project momentum continues to build as the physical construction at the site near Portsmouth, Ohio, progresses. Process Building No. 1 is enclosed, the floor modules for the centrifuge machines are installed, and contracts have been let for the process piping, electrical, heating and ventilation systems. Site preparation and rough grading for all eight process buildings is complete. The fire station, central receiving warehouse, mobile equipment garage, the administration building, and several supporting facilities are finished. Work is well underway on the Recycle/Assembly building, electrical substations, and the process support building. Through FY 1982, $1,585,520,000 has been authorized and $1,539,845,000 appropriated, with estimated costs of $1,197,531,000 against a total estimated project cost of $6,950,000,000 in FY 1983 dollars. Design of the entire complex is over 72 percent complete with six of the nine major architect engineers having essentially finished their design efforts. Three centrifuge machine manufacturers have constructed manufacturing facilities using corporate funding in Ohio and Tennessee. All of the centrifuge manufacturers are in production and have delivered centrifuge machines that have passed the 2,000-hour evaluation test. This demonstrates the capability of United States industry to manufacture the baseline centrifuge.

The FY 1983 request for other centrifuge operations and support on Chart 1 includes the funds to proceed with operational startup plans and procedures to support operation of the first production units of the GCEP, continuation of the advanced gas centrifuge development program, capital equipment and construction. The FY 1983 budget request for these activities is $94,500,000 or an increase of $7,284,000 over FY 1982. GCEP startup activities are increasing by $7,600,000 and developmental activities declining $316,000. Assuming 8 percent escalation, the centrifuge development activities are declining about $6,877,000. This decline reflects a maturing of the centrifuge program.

The Advanced Gas Centrifuge (AGC) program is designed to provide a production centrifuge with separative capacity 50 percent greater than the baseline centrifuge. The advanced technology is an extrapolation of the technology already developed and will be achieved through a modest increase in speed and improved flow management. Development of this design is currently underway and about one-half of the performance increase has already been achieved in early test centrifuges. The advanced technology objectives are reasonable and the probability of this technical achievement is high. We expect that the 50 percent increased performance machine will be available for installation in the third GCEP process building and can be retrofitted into process buildings 1 and 2.

## ADVANCED ISOTOPE SEPARATION

The primary objective of the Advanced Isotope Separation (AIS) program is to develop a technology capable of producing enriched uranium at a cost of less than $40 per SWU in FY 1981 dollars. In addition to low overall cost, AIS offers a process with a low capital investment requirement and low energy consumption. Successful development and deployment of AIS may help replace power intensive diffusion plants or provide new enrichment capacity.

The budget request for the AIS program in FY 1983 is \$34,196,000 in budget authority compared to \$85,711,000 in FY 1982. Operation within this reduced budget is possible by selecting one of the three processes after all essential technical data have been compiled and evaluated for advancement to the engineering development and demonstration phase, and completely terminating in FY 1982 all activities associated with the two nonselected processes.

During the past year, excellent progress has been made on the plasma, atomic vapor, and molecular AIS processes. The primary emphasis in FY 1982 is on the operation of the preprototype testbed systems that are providing a major portion of the data needed for identifying the engineering uncertainties associated with scaling the AIS technologies. This information, along with offline component tests and economic analysis, provide input for both process selection and future engineering development.

In FY 1983 the Agency will upgrade and continue operation of the selected AIS preprototype system and initiate prototype engineering of components by subsystem integration efforts. This approach will provide initial development of the specifications required for the near-production-scale components for the Development/Demonstration Module.

## URANIUM RESOURCES

Assessments of United States resources indicate that at least 1 million short tons of $U_3O_8$ could be recovered at a forward cost of \$30 per pound $U_3O_8$ from reserves and probable potential resources; uranium recovered at a cost of \$30 per pound $U_3O_8$ would be expected to require prices averaging about \$45 per pound. Although the average delivery price for uranium was \$31 per pound in 1981, and spot prices were about \$25 per pound, uranium priced at \$45 per pound should result in nuclear power plant operating costs that continue to be lower than the operating costs in coal-fired power plants in most areas of the United States.

The current forecast range of domestic nuclear power growth indicates that as much as 195 gigawatts could be operating by the year 2000. The 1 million short tons of $U_3O_8$ should be able to support these reactors into the next century.

## STATE OF THE DOMESTIC URANIUM PRODUCING INDUSTRY

The United States uranium industry faces a difficult situation. The industry has overbuilt production capacity and must reduce production in order to be in better balance with demand. The adjustments must be made primarily because of the reductions in uranium demand and falling prices resulting from nuclear power reactor construction delays, cancellations, and lack of new reactor orders. This situation has caused some producers extreme economic hardship and will cause continued economic difficulties over the next few years. On the other hand, some producers reported a profitable year in 1981. After the adjustments are completed, the companies that remain as domestic uranium producers should comprise a viable industry. Other producers can enter the industry as the uranium demand grows.

In 1980, the United States uranium industry produced a record 21,850 short tons of $U_3O_8$. In 1981, the industry produced about 19,000 tons, and in 1982, we estimate a production of about 15,500 tons. Most of this production will be used directly to supply reactor needs, although some of the uranium is projected to be added to utility inventories. In the mid-1980's, domestic utilities are projected to have an average annual requirement (which includes purchase commitments plus uncontracted needs) of about 15,500 tons. Thus, requirements should be in approximate balance with current production. As reactors now under construction begin operation, we expect the domestic utilities' annual requirement for uranium to increase to about 20,000 tons in 1990 and to about 30,000 tons in 1995.

The reduction from the record production level of 21,850 tons to today's production resulted from some mines and mills closing or curtailing production. Employment in the uranium industry has dropped from an all time high of 22,000 in 1979 to around 15,000 at the end of 1981.

Surface drilling for uranium exploration and ore deposit development reached an all time record of 47 million feet drilled in 1978, but has dropped to an estimated 14 million feet in 1981. The outlook for industry exploration work is uncertain at present.

Restrictions on the enrichment of foreign uranium for domestic end-use are being removed in steps according to a plan announced in 1974 by the Atomic Energy Commission in accordance with Section 161v of the Atomic Energy Act of 1954, as amended. The plan allowed initial use of foreign uranium in 1977 limited to 10 percent of an enrichment services customer's feed deliveries to the Agency. The allowable percentages increased to 15 percent in 1978, 20 percent in 1979, 30 percent in 1980, 40 percent in 1981, and 60 percent in 1982. The plan increases the percentage to 80 percent in 1983 and in 1984 there would be no established limit.

In the 5 years from 1977 to 1981, domestic use of foreign uranium has been low as United States buyers have preferred to buy United States uranium. Over the 5 years, only 8 percent of the uranium delivered for enrichment by domestic customers was of foreign origin, compared with an allowable weighted average of 22 percent. In 1981, the actual deliveries of foreign-origin uranium for enrichment have been 9 percent of total domestic deliveries, well below the allowable 40 percent. Although there will be continued and probably increasing use of foreign uranium in the United States, we expect United States buyer preference for domestic uranium to continue.

## URANIUM RESOURCE ASSESSMENT PROGRAM

Because the priority work of the assessment program has been completed, and because of the projected adequacy of the uranium resources to support the industry's needs into the next century, the program is being phased out in FY 1982 and will be terminated in FY 1983.

The goals of the assessment program were to assess and expand the nuclear fuel resource base of the United States; reduce uncertainties about the extent, availability and economics of domestic and foreign nuclear fuel resources; and make available to industry resource information and technology for use in the discovery and production of uranium resources. The program has estimated uranium reserves based on proprietary industry data, analyzed uranium supply, assessed potential uranium resources, developed improved methodology and technology for resource identification, and assessed and supported international activities to estimate the world uranium resource base.

During FY 1982, steps will be taken to complete projects underway and to put the very large data base in order for possible future use. Reduction in force and the termination of the operating contractor at Grand Junction will have to begin in FY 1982 in order to meet required notification periods and funding constraints. Funds requested for FY 1983 are to complete the program closeout activities.

# OFFICE OF THE ASSISTANT SECRETARY FOR NUCLEAR ENERGY

## PRINCIPAL NUCLEAR PROGRAMS

| | |
|---|---|
| RESEARCH DEVELOPMENT & DEMONSTRATION | ENERGY SUPPLY R&D |
| - ADVANCED REACTORS, SUCH AS BREEDERS | |
| - FUEL CYCLE | |
| - SPACE NUCLEAR APPLICATIONS | |
| OPERATIONS | |
| - ENRICHMENT | URANIUM |
| - WASTE MANAGEMENT | ENERGY SUPPLY R&D |
| DEFENSE | |
| - NAVAL REACTORS | ATOMIC ENERGY - DEFENSE |

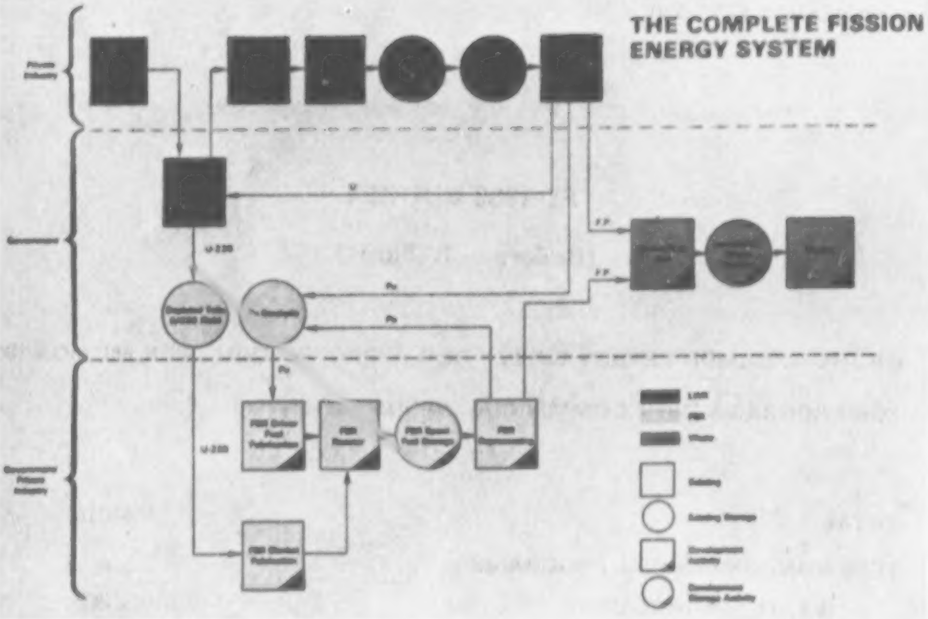
## (FY-1981, 82, 83)
## BUDGET SUMMARY
## (BA in Millions)

| | FY 1981 APPROP. | FY 1982 APPROP. | FY 1983 REQUEST |
|---|---|---|---|
| ENERGY SUPPLY R&D | 1,051 | 1,089 | 1,017 |
| CONVERTER | 83 | 96 | 32 |
| BREEDER | 611 | 647 | 577 |
| ADVANCED NUCLEAR SYSTEMS | 40 | 38 | 31 |
| COMMERCIAL NUCLEAR WASTE | 189 | 210 | 81 |
| NUCLEAR WASTE DISPOSAL FUND | -- | -- | 185 |
| REMEDIAL ACTIONS | 43 | 43 | 50 |
| NUCLEAR FUEL CYCLE | 83 | 53 | 59 |
| POLICY AND MANAGEMENT | 2 | 2 | 2 |
| URANIUM ENRICHMENT | -23 | -25 | 0 |
| ENRICHMENT | 1,167 | 1,709 | 1,930 |
| ADVANCED ISOTOPE SEPARATION TECHNOLOGY | 80 | 86 | 34 |
| URANIUM RESOURCE ASSESSMENT | 31 | 10 | 3 |
| REVENUES | -1,301 | -1,830 | -2,033 |
| DOE RESERVE FOR FY 1984 | -- | -- | 66 |
| ATOMIC ENERGY AND DEFENSE | 303 | 359 | 376 |
| NAVAL REACTORS DEVELOPMENT | 303 | 359 | 376 |
| TOTAL - NUCLEAR ENERGY | 1,331 | 1,423 | 1,393 |

# PRESIDENT'S NUCLEAR POLICY

## Energy Supply R&D

- Revitalize LWR Industry
- Waste Disposal
- Breeder Reactors
- Commercial Reprocessing



THE COMPLETE FISSION ENERGY SYSTEM

Private Industry
Government
U
U-238
F.P.
F.P.
Pu
Pu
Pu
U-238
LWR
FBR
Waste
Existing
Existing Storage
Development Activity
Development Storage Activity

## ASSISTANT SECRETARY FOR NUCLEAR ENERGY

### FY 1983 BUDGET REQUEST

### (Dollars in Billions)

OF THE $3.4 BILLION PROGRAM MANAGED BY THE ASSISTANT SECRETARY FOR NUCLEAR ENERGY, $1.0 BILLION IS INCLUDED IN THE ENERGY SUPPLY R&D APPROPRIATION.

| | |
|---|---|
| TOTAL | $3.4 |
| LESS DEFENSE ACTIVITIES (NAVAL REACTORS) | - .4 |
| LESS PRODUCTION OPERATIONS (URANIUM ENRICHMENT) | -2.0 |
| ENERGY SUPPLY R&D (NUCLEAR FISSION) | $1.0 |

### FY 1983 BUDGET

### (Dollars in Millions)

OF THE $1 BILLION ENERGY SUPPLY R&D APPROPRIATION, $670 MILLION IS FOR PROGRAMS WITH COMMERCIALIZATION POTENTIAL.

| | |
|---|---|
| TOTAL | $1016 |
| LESS NONCOMMERCIAL PROGRAMS | |
| o WASTE MANAGEMENT | - 265 |
| o REMEDIAL ACTIONS | - 50 |
| o ADVANCED NUCLEAR SYSTEMS (SPACE) | 31 |
| FISSION PROGRAMS WITH COMMERCIALIZATION POTENTIAL | $ 670 |

## ASSISTANT SECRETARY FOR NUCLEAR ENERGY
## FY 1983 BUDGET
## PROGRAMS WITH COMMERCIALIZATION POTENTIAL

| | FY 1982 | FY 1983 |
|---|---|---|
| BREEDER REACTORS<br>(CRBR) | 647<br>(194) | 578<br>(253) |
| CONVERTER REACTORS | 96 | 32 |
| FUEL CYCLE | 53 | 60 |
| TOTAL | 796 | 670 |

TOTAL PROGRAM REDUCTION= 16 PERCENT

REDUCTION OF PROGRAMS OTHER THAN CRBR = 31 PERCENT

## SPECIFIC PROGRAM REDUCTIONS

| | FY 1982 | FY 1983 | Δ |
|---|---|---|---|
| BREEDER BASE R&D | 367 | 261 | -106 |
| CONVERTER REACTORS | 96 | 32 | - 64 |
| WATER COOLED BREEDER | 52 | 42 | -10 |
| ADVANCED REACTOR SYSTEMS | 4 | 0 | - 4 |

# ASSISTANT SECRETARY FOR NUCLEAR ENERGY
# FY 1983 BUDGET
# SUMMARY

FY 1983 REQUEST FOR FISSION PROGRAMS WITH COMMERCIALIZATION POTENTIAL UNDER ENERGY R&D

- REPRESENTS LEGITIMATE LONG TERM, HIGH RISK, HIGH POTENTIAL BENEFIT R&D
- IS FOCUSED ON SEVERAL CLEARLY DEFINED MAJOR MISSIONS
- IS REDUCED COMPARED TO FY 1982
- IS RESPONSIVE TO PRESIDENT'S NUCLEAR POLICY DIRECTIVE

## ENERGY SUPPLY R&D
## (BA IN $ MILLIONS)

| | FY 1982 | FY 1983 |
|---|---|---|
| Breeder Systems | 647 | 577 |
| Converter Systems | 96 | 32 |
| Advanced Nuclear Systems | 38 | 31 |
| Remedial Actions | 43 | 50 |
| Nuclear Fuel Cycle | 53 | 59 |
| Commercial Nuclear Waste | 210 | 81 |
| Policy and Management | 2 | 2 |
| Subtotal | 1,089 | 832 |
| Nuclear Waste Disposal Fund | 0 | 185 |
| Total | 1,089 | 1,017 |

### INTRODUCTION OF ASSOCIATES

Dr. **BREWER**. I have with me today on my left, Mr. Bill Voigt, the Acting Director of the Office of Uranium Enrichment and Assessment.

On my immediate right, Mr. Sheldon Meyers, standing in for the Deputy Assistant Secretary for Nuclear Reactor Programs, Mr. Chipman.

Then on my far right is Dr. Franklin Coffman, Deputy Assistant Secretary for Nuclear Waste Management and Fuel Cycle Programs.

As you pointed out, I have a lengthy statement for the record, and with your permission, I would like to proceed informally with a few charts, and I promise to keep it short.

Chairman **HATFIELD**. That is very welcome news. Please proceed.

Dr. **BREWER**. Referring to our first chart here, the Department of Energy nuclear programs, Senator, are funded by three appropriations; these are energy supply R. & D., uranium enrichment, and atomic energy defense.

My Office has three basic types of programs. The first is the development of nuclear systems such as the breeder reactor system and associated fuel cycles.

The second type of program we have is strictly an operational or business function. I have the responsibility, with Mr. Voigt, of operating the Nation's uranium enrichment complex.

Then the third major type of program is the defense area, the naval reactors program.

### NUCLEAR ENERGY R. & D. BUDGET

Going to the next chart—we can return to the budget summary chart—this gives detail for the three appropriations. The energy supply R. & D. includes the breeder and converter reactor research and development and fuel cycles. Naval reactors are in the atomic energy defense appropriation, and uranium enrichment has its own appropriation.

I would like to turn now, Senator, to a review of the President's nuclear policy statement of October 8.

### PRESIDENT'S NUCLEAR POLICY STATEMENT

After very careful review during the spring of last year, we concluded that our programs should focus very sharply on a few major national objectives, rather than a plethora of small technological efforts. The principal ingredients arrived at in the President's statement, and touched on in my confirmation statement, are the four listed on this chart.

The first is to restore the light water reactor economy to health. As you know, there have been no light water reactor orders for the past 4 or 5 years, and there has been a large drop in the number of reactors under construction and in the pipeline. The causative problems, we feel, are institutional and financial in nature and not technical.

The second major policy objective as stipulated by the President is to complete our statutory responsibilities to close the back end of the fuel cycle—to develop and make operational systems which will dispose of the high-level waste generated by the nuclear system.

The third major policy objective is to create a regulatory and institutional climate in which reprocessing can occur in this country, as a private sector enterprise.

### SPENT FUEL REPROCESSING

As you know, reprocessing has been tried three times in this country and failed three times, largely because of Federal policy instability and regulatory uncertainties.

The first attempt was West Valley, the second was Morris—Morris was a technical problem. The third attempt was the Barnwell project, which is practically complete, but the owners have expressed a disinclination to place the plant in operation.

Finally, the fourth major policy objective is to complete the nuclear system—to proceed with scaleup of the breeder technology through a series of demonstrations, including Clinch River, and to finish the work begun several decades ago by the pioneers of the nuclear industry and sustained by seven U. S. Presidents.

### NUCLEAR FUEL CYCLE

The next chart is intended to show the interaction of the two fuel cycles, the light water reactor cycle and the breeder fuel cycle.

They are coupled at two fundamental places in the cycle. The first is the U–238 tailings stockpile, generated by enrichment operations. The U–238 stockpile will be used as blanket material for the breeder reactor and converted to plutonium. There is enough in the stockpile at this time to sustain our Nation's electrical requirement for several hundred years.

The second point of contact is the reprocessing of light water reactor fuel which will yield a plutonium inventory needed to start up the breeder economy.

### NUCLEAR R. & D. BUDGET

I would like to turn now, Mr. Chairman, to the next chart to give you a very brief insight into the architecture of our budget. The total fiscal year 1983 budget request for the programs that I manage in the Department of Energy is $3.4 billion. If we subtract the naval reactors budget, which is $0.4 billion—and I am using round numbers for illustrative purposes—and if we subtract the enrichment budget which is $2 billion, the remainder is $1 billion for the energy supply research and development budget.

I would like to emphasize that the enrichment budget is offset by revenues of about $2 billion. It is designed for full cost recovery, to recover all costs of construction and operation of the enrichment facilities.

These programs—the Navy reactor program and the enrichment program—are statutory responsibilities. They are not, in our terminology, discretionary; they are programs which must be done.

So the bottom line is $1 billion for research and development.

### RESEARCH AND DEVELOPMENT ACTIVITIES

Of that $1 billion, let us disaggregate that.

The waste management budget is about $265 million, and that, too, is a statutory responsibility; ultimately, the waste management will be conducted much like the enrichment business is now. It will be an operational matter to receive waste and to collect fees from the utilities.

Another element of the waste management program is the remedial action program to clean up mill tailings, et cetera. Again, this is an operational responsibility, not research and development.

And the third item you see there is space—the advanced nuclear systems program.

Subtracting those three operational programs from the $1 billion, you get a figure of $670 million, which is aimed at programs which will ultimately be commercialized, such as the breeder.

Could I have the next chart, please?

I would like to emphasize, Mr. Chairman, some of the major deltas associated with the remainder of the $1 billion. The breeder reactor program is down; it has been reduced. The breeder base technology program has been reduced by about $100 million, as you see in this chart.

The Clinch River Breeder Reactor request, however, is up. Acceleration of the Clinch River project is an article of the President's policy.

The converter reactor budget is down and the fuel cycle program is about level.

The conclusion is, if you ignore Clinch River, that the reduction in the R. & D. budget is about 30 percent.

My point, Mr. Chairman, in walking you through this budget architecture, is to emphasize the point that the nuclear budget is down in the Department of Energy. We have very carefully assessed our priorities. We have focused our resources on the essence of the President's excellent policy statement. While it still has the lion's share of the energy budget, our budget is down compared to R. & D. in the Carter budget for fiscal year 1982.

Mr. Chairman, this completes my formal statement, and we would be pleased to answer any questions that you may have at this time.

### FEDERAL ROLE IN NUCLEAR POWER DEVELOPMENT

Chairman HATFIELD. Thank you, Mr. Secretary.

The Department's budget justification includes a section entitled "Goals," and under that section there is a discussion regarding the changed role of DOE in deployment of light water reactors. The material indicates that DOE's role will include, among other activities: One, to improve utility financial condition; two, utilizing research results to reduce cost and economic risks; and three, initiating a program to accurately inform the public of the facts concerning nuclear power.

My question is, Why do you believe these are proper activities for the Federal Government and DOE to be involved in?

Dr. BREWER. Mr. Chairman, I would start with the last item there.

The public's understanding of nuclear power is woefully deficient. We have learned through polls, for example, that as much as half of the public believes that the nuclear powerplant can explode like an atomic bomb, and we, of course, know that is not the case.

Another large segment of the public associates acid rain with nuclear power, and that, as we know, is a fossil energy phenomenon.

For an energy option which we feel will play such a major role in our Nation's energy economy in the future, it is an awesome thought that the public is so grossly misinformed. The information program that we have in mind is not one to champion nuclear power at the expense of other energy options, but merely to provide factual data to the public.

Chairman HATFIELD. What is the parallel policy of the Department in the area of solar and other renewable energy sources? Is there a similar role being played by the Department in these areas?

Dr. BREWER. Senator, I cannot speak to the current informational policy of the Department in those areas, but I can tell you that during the past administration, there was a very, very robust public information program for solar and conservation.

Chairman HATFIELD. But we have eliminated that now, because the philosophy is that that is up to the private sector.

Now, why is it not up to the private sector to take on this burden and responsibility to so inform the public? You do not think the airport hasslers are doing an adequate job?

Dr. BREWER. Well, Senator, as a matter of fact, the private sector is doing quite a job in educating the public on nuclear power. You have only to read the advertisements in the Washington Post, et cetera.

Our role, we feel, is a nonpromotional one, a role to educate the public on what a reactor is, how it works, what are the steps in the fuel cycle, when and how nuclear energy was invented, and the steps that have been taken since the late 1940's to keep it on line.

Chairman HATFIELD. You do not consider this cheerleading?

Dr. BREWER. I consider it a simple statement of fact, and that is our direction and that is our intention.

Chairman HATFIELD. How much are you asking in that area to so educate the public?

Dr. BREWER. I would like to provide the exact figure for the record, Mr. Chairman.

Chairman HATFIELD. Would you please?

And would you, at the same time, give us a comparison of what we have done in this area in the last 5 years?

Dr. BREWER. Yes, sir; I would be happy to.

Chairman HATFIELD. And specifically where these items are listed in the budget?

Dr. BREWER. Yes, sir.

Chairman HATFIELD. So that we will have easy access to them.

Dr. BREWER. Yes, sir.

[CLERK'S NOTE: The information appears on p. 1246.]

## CLINCH RIVER BREEDER REACTOR

Chairman HATFIELD. In November, the Department's Energy Research Advisory Board decided against proceeding with the demonstration plant for breeder reactors any time soon. ERAB found that given low growth rates in electrical demand, that in the tight budget, DOE's limited funds would be better deployed elsewhere.

Ignoring this recommendation, DOE's budget emphasized breeder funding with larger increases for the Clinch River demonstration plant.

Dr. BREWER. Senator, the ERAB report was considered, and its advice in this particular matter rejected. They did, as a matter of fact, rate the breeder program as a high priority, but the Clinch River reactor as a low priority. We disagreed.

The assertion that we can tell with any precision the date or the time or the hour that the breeder will be needed is, in our opinion, foolish.

Generally, we feel the breeder will be needed sometime soon after the turn of the century, plus or minus 5 years, and the leadtime for having the breeder available when needed is perhaps between 25 and 30 years. If the breeder is available earlier than needed as determined by our uranium resource base or the nuclear growth rate, then the technology can be put on the shelf and deployed later when the economics justify it.

If, however, the breeder is late, the consequences could be very severe.

Chairman HATFIELD. But now if I am correct, we have not ordered any light water reactors since 1978, and I think 34 have been canceled. In the face of all this, you really believe we should be aggressively pursuing the breeder technology?

Dr. BREWER. Yes, sir; the conditions for a renaissance in orders for light water reactors could occur in the early or mid-1980's. The growth rate for nuclear power has been lower than that projected. For example, in 1972, I believe, the Commission was projecting a nuclear capacity in the year 2000 of 1,200 gigawatts, and that is about 1,200 plants. The total electrical projection—nuclear, coal, fossil fuels, et cetera—is about that figure now.

### LWR ORDERS

Chairman HATFIELD. You are aware of the situation in the Pacific Northwest with what is happening to Washington public utilities and consortium effort on WPPS-1, WPPS-2, WPPS-3, WPPS-4, and WPPS-5?

Dr. BREWER. Yes, sir.

Chairman HATFIELD. For the record, would you state the current situation on those five reactors?

Dr. BREWER. Reactors 4 and 5 have been terminated and reactor 1 has been deferred.

Chairman HATFIELD. And, of course, you know we have another called Pebble Springs in the process of being approved to be built under private initiative, private industry? Do you expect that to really ever be built in the next decade or so?

Dr. BREWER. I would not like to comment on Pebble Springs.

But I would state this, Mr. Chairman, there are, of course, underlying causes for these terminations. One is the sheer duration of the licensing and construction process. Whereas in the early days reactors could be built and licensed in 6 or 7 years, the leadtime is now as much as 14 years.

A second factor is, as you have indicated, a larger projected demand than realized for electricity.

### LICENSING OF BREEDER REACTORS

Chairman HATFIELD. Do you anticipate it will take a shorter or longer time to license a breeder reactor, based on the experience that we have had on these other reactors?

Dr. BREWER. I suspect, Senator, that it can be licensed at least in the same period of time it takes to license a light water reactor.

Chairman HATFIELD. And what would be the comparative costs?

Dr. BREWER. The cost, of course, Senator, is relative. The breeder is thought to have a capital cost disadvantage. It has a very large fuel cycle cost advantage, because it operates on uranium that is already stockpiled.

So you have to look at two factors, the uranium cost for the light water reactor versus the capital cost penalty, if you will, for the breeder. The crossover point is thought to occur somewhere around $100 per pound for uranium.

### GAS CENTRIFUGE ENRICHMENT PROJECT

Chairman HATFIELD. Mr. Secretary, let me turn for a moment to the uranium enrichment program, and particularly the project at Portsmouth.

Dr. Brewer and Mr. Voigt are specialists here. I know that you are well aware of the GCEP study, which will be an extremely critical study according to the preliminary information that I received, extremely critical of the project. It appears from all the data that one fundamental issue is the future demand for the enriched uranium services, and we will have a series of detailed written questions on this and other issues relating to the GCEP.

In the past, DOE has indicated that GCEP would be built incrementally, I believe. Let me just ask you this one question. Do you think it is economically justifiable to build just the 2.2 million work units in new capacity for GCEP at this time, and what would be the cost associated with only building the first 2.2 million increment?

Dr. BREWER. Mr. Voigt?

Mr. VOIGT. Mr. Chairman, the first two process buildings will have a long-term capacity of 3.3 million separative work units (SWU) per year. The marginal cost of that production is $114 per SWU, as contrasted to the marginal module cost out of the gaseous diffusion plants of $108 per SWU in fiscal year 1983 dollars.

If we project that to 1996, at a 9-percent escalation, the comparable numbers would be $205 per SWU for the gas centrifuge plant and the corresponding number out of the diffusion plant would be $330 per SWU.

So from that standpoint, the answer is "Yes."

### GAO REPORT ON GCEP

Chairman HATFIELD. Have you had any preliminary information from the GAO on this?

Mr. VOIGT. Mr. Chairman, I have requested a briefing from GAO on a repeated basis, and I have been refused; in fact, they refuse to give me any information.

Chairman HATFIELD. You have had no draft of any part of this study?

Mr. VOIGT. My understanding is that there is a draft that came out today, but I have not seen it.

Chairman HATFIELD. I wonder, if we keep the record open, how long you think it would take you to give us a summary in your response to the GAO report?

Mr. VOIGT. I think that would depend to the degree of how much we disagree or agree with them.

But the answer is, I think it would be in the framework of 2 weeks.

Chairman HATFIELD. Well, we would find it very important, I think, in having your response as soon as you possibly could give us a response.

Mr. VOIGT. We would be most happy to.

[The response to the GAO report follows:]

## Detailed DOE Comments on May 12, 1982 Draft GAO Report

### GCEP Justification

GAO states (page 5) that the DOE economic model (EDIC) used in the 1980 Strategy Study is the basis for DOE's economic justification for GCEP. The implication that this is the only supporting analysis is totally wrong. Other analyses, using independent cash flow calculations, have been performed such as reported in the December 1981 Operating Plan Paper. Comparisons of the unit cost of product and future prices of enrichment services also have been calculated. All of these analyses support DOE's claim that completing GCEP will lower the costs of uranium enrichment and provide assurance that enrichment costs will not escalate rapidly if AIS is not available.

### GCEP Costs

GAO states (page 9) that due to uncertainties in project costs, it is GAO's policy to increase estimated costs by 10 percent and 20 percent to recognize historical cost overruns. In their analysis they apply these increases to both the GCEP capital and operating costs while admitting later (page 25) that "in fact, we found that both the centrifuge machine development program and the gas centrifuge plant construction project are generally proceeding within cost and schedule objectives." There is good reason to believe that this good record will continue since the plant involves constructing eight process buildings which are essentially identical. One building is almost completed and a major support facility, the Recycle/Assembly Building, is well under construction. While a significant portion of GCEP costs are represented by the centrifuge machines, a significant number of prototype machines have been manufactured and are being tested. Furthermore, machine manufacturers are in competition for additional contracts.

We have confidence in the GCEP construction cost estimates. To date, the estimated cost has remained stable with the exception of escalation and costs associated with deliberate schedule delays. The bulk of the technical support/engineering has been complete providing a sound basis for estimating procurement and construction costs. We have bid experience on 90 percent of the construction and procurement packages, other than the centrifuge machines. The centrifuge machine cost is 40 percent of the plant cost. The only estimating difficulty in centrifuge cost is the rotor. The costs associated with the rotor represent less than one-fourth of the total machine cost, or less than 10 percent of the total project cost.

Furthermore in regard to centrifuge plant costs, GAO has used the principle of "guilt by association" rather than a detailed analysis of the project cost bases and trends. Comparison of GCEP cost to projects outside of uranium enrichment is not as relevant as comparison to historical costs experienced by DOE in the enrichment field. For example, DOE's cost experience on the Cascade Improvement and Uprating (CIP/CUP) programs has been very good and actually has underrun the cost estimate. The circumstances surrounding the GCEP cost are summarized very well in an Engineering News Record article dated April 29, 1982. The article states "Confounding predictions that first-of-a-kind process-plant megaprojects inevitably go awry, the Department of Energy's $10 billion gas centrifuge uranium enrichment plant, after three years of construction, is rising on schedule near Piketon, Ohio, within 1 percent of 1979 estimates. A detailed conceptual design, smart management, liberal design fees, hungry contractors and cooperative unions are combining to prove the pundits wrong."

Enrichment Demand

Based upon recent developments, we agree with GAO (pages 13, 14, and 24) that the year 2000 demand projections contained in our last year's forecast have eroded. Our most recent prelimnary assessment is that our new mid-range forecast by the year 2000 will be closer to the GAO forecast than our previous estimate. We do note, however, that GAC is quick to point out forecasts that are significantly lower than our last year's forecast, but ignores other forecasts that are in the ball park of our last year's estimate, such as those contained in the Energy Information Agency Annual Report to Congress published in February of this year.

Furthermore, low forecasts of SWU demand can very easily become self-fulfilling and the market to be served by DOE in the future will depend, to a very large extent, on actions we take today. We must take positive actions, such as construction of GCEP, to capture that demand. Failure to construct the most cost efficient technologies available today will result in further reductions in sales as has been the case in other U.S. industries.

AIS Costs

The treatment of uncertainty for the well developed gas centrifuge technology discussed earlier is completely ignored by GAO in assigning costs to the undeveloped AIS processes. While DOE feels that the AIS processes have good potential, DOE recognizes and GAO states (page 15) that "It is important to recognize, however, that this technology is still in the early stages of development and still faces a number of uncertainties." There is a significant risk that AIS might not be available in 1995 or at current projected costs as GAO chose to assume in its analyses. GAO ignored the risk and associated costs of AIS schedule slippage which are very significant. It is also noteworthy that GAO did not apply its "policy" of escalating the AIS estimated costs by 10 and 20 percent in recognition of historic overruns. Failure to treat AIS costs on a comparable basis as GCEP costs is evidencary of GAO's bias against GCEP.

GAO Economic Analysis

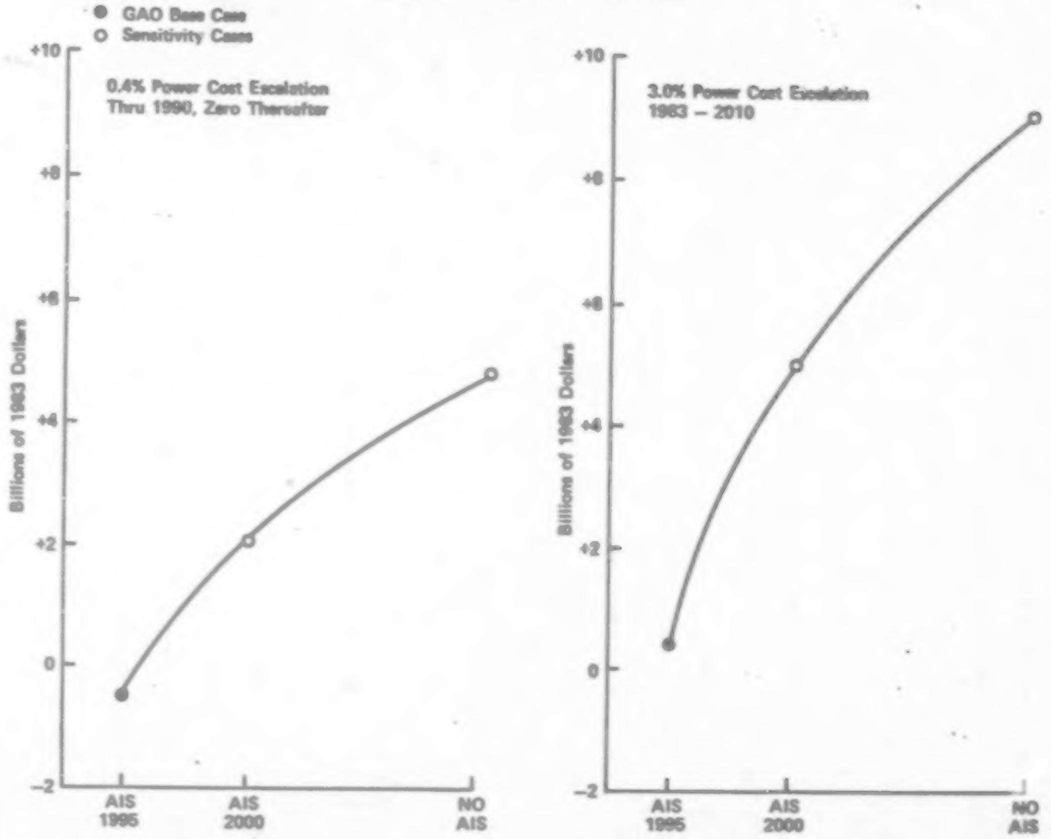
DOE, in performing the 1980 Enrichment Strategy Study and in its current analysis, recognized the risks associated with the undeveloped AIS technology. In GAO's economic analysis (beginning page 16), they state that at their estimated demand level of 217 GWe, it is slightly cheaper to meet demands with the gaseous diffusion plants (GDPs) and AIS and not build GCEP. This is the same result as previously indicated by DOE in the 1980 Strategy Study. However, in assessing risk DOE recognized that this slight savings disappears quickly if AIS fails to meet the 1995 completion date. The major concern in the DOE enrichment program is that GDP production costs are increasing rapidly and markedly due to its dependence on electric power. Savings can be realized by replacing it with lower-cost capacity, either gas centrifuge, AIS, or a combination of both. Using GAO's recommended assumptions, the net present value savings of replacing GDP capacity with GCEP and AIS is $8.5 billion. If AIS is available in 1995 at projected very low enrichment prices and is used instead of GCEP to replace GDP capacity, the savings would be $9.0 billion which is $0.5 billion better than the combination of GCEP and AIS. However, just a one-year delay in AIS availability eliminates this apparent $0.5 billion AIS advantage. If AIS availability is delayed five years to CY 2000, the AIS advantage becomes a $2.1 billion disadvantage, even if AIS costs don't increase. This sensitivity to the AIS availability date is graphically demonstrated in Figure 1. This sensitivity was one of the major issues in the 1980 Strategy Study and is discussed by GAO in their report (page 17). However, GAO ignored this vital issue in their quantitative analysis.

In structuring its economic analysis (page 29), GAO projected constant dollar electric power cost escalation of 0.4 percent per year through 1990 and 0 percent thereafter. This results in a 1990 rate that is only 3.2 percent higher than today's rate in constant dollars. GAO indicated that these results were consistent with the mid-case electric power price escalation rate in the Energy Information Administration (EIA) 1981 Annual Report to Congress. Tabular data from that report shows, however, that EIA is projecting real industrial power cost growth in the period 1980 to 1995 ranging from 1.2 to 1.7 percent per year. This results in a real increase that is three to four times the GAO figure. Over the last 10 years the cost of power to the uranium enrichment plants has increased an average of about 8 percent per year over the general inflation rate.

Figure 1

**GCEP Benefit**

**(Net Present Value 1983-2010)**



Furthermore, GAO has not included in their analysis the impact of all of DOE's power contracts expiring in the early 1990's. Less favorable terms and conditions are likely to result in new power contracts which could increase the long-term costs of power significantly.

Power costs are also significant risk factors. As shown in Figure 1, a higher power cost escalation of 3.0 percent eliminates the AIS advantage and results in a greater benefit for completing GCEP. The GCEP benefit increases from $0.4 billion if AIS is on schedule, to a benefit of $5.0 billion if AIS is delayed five years. While DOE believes that 3 percent power cost escalation is on the high side, this comparison demonstrates the sensitivity of the results to this parameter and quantifies the large risk that would be assumed if GCEP is not built. As shown in Figure 1, GAO selected a very biased set of assumptions and presented this "tip of the iceberg" as a basis for making a decision on GCEP. Underlying their analysis is a large matrix of risks that could result in significant costs to the Government and DOE enrichment services customers.

DOE ran 24 case studies at GAO's request. The GAO bias is evidenced by the cases that were selectively used in the report. All cases used in the GAO report assume that AIS will be available on schedule (1995) and at the current estimated cost. Cases which excluded AIS in order to isolate the impacts of GCEP alone were not reported. Those cases showed that even with GCEP capital and operating costs increased by 10 percent and only a 0.4 percent power escalation rate; GCEP shows a net present value benefit of $4.1 billion at GAO's 217 GWe demand level and a benefit of $2.4 billion at GAO's lowest demand of 184 GWe. This positive benefit of replacing GDP capacity with GCEP was ignored by GAO in their report.

## Validation of the EDIC Model

In the draft report, several references (pages 10 and 16) were made to "errors in the economic model." While doubting the accuracy of total cost (Total Enterprice Cost or TEC) as calculated by the model, acknowledgement was made that the model "may accurately determine which strategy is most cost effective on a relative basis" (pages 10 and 20). Commenting that "inadequate documentation prevented validation without extensive consultation with personnel familiar with the model," GAO also states that "we did conduct the necessary consultations" (page 20). Since the EDIC model was used for performing comparisons of various enrichment strategies under optimized conditions, and since extensive assistance was provided to GAO by both DOE and Union Carbide Corporation - Nuclear Division personnel over the period December 1981 through April 1982, it would appear from GAO's own statements that use of the EDIC model to perform studies such as the 1980 Strategy Study is a valid application.

The alleged errors and deficiencies in the EDIC model are described more fully on pages 20 to 22 of the draft report and our responses are directed toward these comments, as follows:

1. "DOE failed to adequately document the model." There is some justification for this comment since the only existing documents prior to December 1981 consisted of a User's Manual and a published report by D. E. Hatch and S. A. Levin. However, from December 1981 through April 1982, considerable assistance was provided to GAO including written memoranda and copies of computer outputs of cases from the 1980 Strategy Study.

   The only mathematical errors in the article are those caused by typographical errors. These typographical errors in the Hatch and Levin article were pointed out to GAO in a meeting in January 1982. Thus, the comment that "the article is inconsistent and imprecise in its use of mathematical notations" is needless sensationalism and an unnecessary rebuke of this article.

2. "DOE artifically constrained the model." This statement refers to the segmented manner in which the optimization runs were made in two separate steps. The "technical difficulty," that of obtaining a reasonable estimate for the j-year (i.e., the year of government feed stockpile exhaustion), was overcome by this two-step procedure. The initial step defined the optimum operation of the enrichment complex during the period when enriched product was being preproduced for the stockpile. The second step incorporated the optimized results from the first step and obtained the optimum operating conditions for the enrichment complex during the remaining years when the separative work demand was being "tracked." While not as straight forward as a single step optimization might be, this two-step optimization for two sequential time periods provides a valid solution. The term "artificially constrained" appears to be needless sensationalism and inappropriate for describing this two-step procedure.

DOE provided an explanation of the j-year procedure in an April 5 letter to GAO. The two-step campaign calculation of each case was used so that a better estimate of the j-year could be obtained by the model. This revision also aided in reducing the amount of computer time required. Thus, the two explanations referenced on page 21 given by DOE and Union Carbide are not contradictory and are both correct, although a higher priority was accorded to the need to improve the j-year estimate.

The version of EDIC model used prior to July 1980 was superseded (and is no longer available) by the improved model which employs a more efficient algorithm for estimating j-year. This model is able to analyze the entire campaign in a single run. As told repeatedly to GAO, reruns of the 1980 Strategy Study cases with this improved model gave Total Enterprise Costs (TEC) that were a fraction of a percent of the TECs obtained in the original study. Most importantly, there were no changes in the relative rankings of any of the cases.

3. "The model does not in one instance reflect economic reality." This comment refers to the manner in which the feed stockpile is valued at the j-year market price when the government feed stockpile is exhausted and that price is present valued to the year of feed usage. As indicated in the footnote on page 22, the government feed stockpile was accumulated as a result of purchases in the early years when the government provided support to a developing uranium mining industry. Since the cost of this stockpile is a sunk cost, the valuation to be placed on the stockpile should be a representation of the fair worth or value of this stockpile. As long as the stockpile exists, the government avoids having the expense of purchasing any feed material. Thus, the value of any feed material extracted from the stockpile and transferred to the cascade is reflected in the cost to the government of an equivalent amount of feed material that must be purchased at some point in the future when the stockpile is exhausted. The present value in the year of consumption of this future cost of feed is the proper method for calculating the value of this stockpile.

   In reference to the statement that "as a result, the model uses too much feed and not enough electric power" (page 22), a series of cases were run by Union Carbide in which tails assays were fixed at successively lower values for the period FY 1983 thru FY 1988 in order to force the use of more power and less feed. These results were then compared to the corresponding GAO requested case in which the tails assays are optimized throughout the campaign. These results showed that more power and less feed results in higher TECs than the optimum solution of the original case.

4. "Computer incorrectly executed the uranium feed portion of the mathematical model." For the low demand level cases, the EDIC model experiences difficulty in obtaining a reliable estimate of the j-year when the feed stockpile is exhausted. To minimize this problem, the campaign was subdivided into two

subcampaigns as mentioned under item 2 above. As a result, the estimated j-year as utilized in the calculation is accurate to within a very few years (1-4 years) of the actual j-year that the model calculates. For the five base cases in which "the feed stockpile was never depleted, yet the computer program still assigned values to stockpile feed" (page 22), the "assumed j-year" obtained in the two-step campaign calculation was early so that the feed cost was under-discounted. As a consequence, feed was not used as fast as it should have been and the stockpile was not exhausted. Union Carbide has evaluated the significance of this phenomena using the improved (current version of EDIC which does a better job of estimating the j-year as well as a new model which is currently nearing completion which estimates the j-year precisely. The results of many significant calculations have shown that the magnitude of this and other minor deviations involved in the optimizations result in TEC increases of only a fraction of a percent and were not significant in terms of modifying the relative rankings of cases in the 1980 strategy study.

## U.S. Competitive Position

Despite GAO's claims (page 30), cancelling or delaying GCEP would seriously affect the competitive position of the U.S. in the international market. The U.S. has realized a dramatic decline in foreign sales of enrichment services, from a 100 percent market share in 1974 to about 35 percent in 1980. Today, the U.S. share of the foreign market remains at about 35 percent. A combination of factors in addition to price contributed to this phenomenon, including supply diversification needs, supply assurance, national goals and politics. However, our customers have consistently repeated since 1981 that these other factors are now relatively insignificant and future purchase decisions will be based primarily upon the availability of low enrichment prices and the reasonable predictability of low prices in the future.

We have emphasized to all existing and potential customers that appreciable cost reductions are expected in the U.S. enrichment program by virtue of U.S. leadership in and utilization of advanced enrichment technologies. Our customers universally accept the concept that future enrichment prices will be more favorable with the incorporation of the more economical, less energy intensive centrifuge technology being installed in GCEP.

On May 10, 1982, Egypt signed three new 30-year enrichment contracts with the U.S. in addition to a contract modification of the one existing contract increasing the sales commitment by one-third. Sales from these four contracts are expected to total about $1.5 billion. Since the first deliveries are not expected to be made until the early 1990's, the role of GCEP to assure low enrichment services over the long term was a major factor in securing this sale. There are additional sales opportunities in the next few years for over 10 contracts with an annual sales value in excess of $100 million (lifetime sales would represent about $3.0 billion). These include new sales in Taiwan and Yugoslavia in addition to follow-on contracts in the Federal Republic of Germany, Switzerland, and the Netherlands. We have been informed that price will represent a crucial element in these decisions. Future low cost enrichment from GCEP represents a valuable sales incentive in this regard.

The Department currently holds domestic and foreign contracts with a lifetime sales value in excess of $100 billion, of which about one-third is foreign. While the termination provisions of these contracts vary, our customers can terminate the contracts at no cost with 3-1/2 to 10 years notice. These existing contracts are vulnerable to termination if the U.S. does not take action to keep our price competitive.

Without GCEP, U.S. enrichment prices will be perceived by our customers, and has already been emphasized by our competitors, Eurodif and Urenco, as being significantly higher in the future. Eurodif, due in part to the weakness of the French franc, presently offers enrichment prices slightly lower than the U.S. price. A number of our foreign customers have already terminated contracts with us and recontracted with Urenco. Both foreign competitors stand to realize a considerable market advantage if the potential of GCEP is not realized in the U.S. It is also significant to note that U.S. utilities have expressed a willingness to contract with Eurodif rather than the U.S. if the future economies of U.S. enrichment services do not improve. Though a detailed estimate of potential sales losses is not possible, the continued strength and vitality of a U.S. government enterprise which produces $2 to $3 billion in annual revenues, of which about one-third represents a positive contribution to the U.S. balance of payments position, is a worthwhile consideration. In this regard, the commitment to building GCEP is a major positive force.

## Balance of Payments

In their discussion of the benefits to the U.S. balance of payments (pages 32 and 33), GAO once again downplays the positive aspects of the uranium enrichment program. Foreign sales in FY 1980 were $454 million which GAO dismisses as only being one-tenth of one percent of total U.S. exports in 1980. Continuing to keep current customers and attract new customers is a major DOE goal which will increase the balance of payment benefits. Foreign sales in FY 1982 are estiamted to be $840 million. We strongly disagree with GAO that this balance of payment impact is insignificant and can, therefore, be ignored. When our nation is in a negative trade balance, all large contributions are important in reducing the deficit. Also, to the extent that domestic utilities purchase foreign SWUs because of price, would further adversely impact balance of payments.

In the discussion of budgetary impacts (pages 34-37), GAO notes that $5.8 billion remains to be spent on GCEP through FY 1994. GAO does not address the impact on future budgets if GCEP is not completed and additional GDP power must be purchased in the future. Compared to operating the GDP's alone, the completion of GCEP at a cost of $5.8 billion will result in future power cost savings of tens of billions (in today's dollars) even if power costs escalate at only 0.4 percent through FY 1990. This is why GCEP is being built -- to relieve the DOE uranium enrichment customers of the burden of future power costs.

Furthermore, should GCEP be terminated at the end of FY 1982, the budget authority request for FY 1983 for GCEP could be reduced from $613 to $350 million. The $350 million would be needed to pay termination costs for existing GCEP related contracts. In addition, uranium enrichment revenues would decrease by about $112 million in FY 1983 because GCEP costs would be deleted from the cost recovery charge. The net impact on the overall FY 1983 enrichment budget would be a decrease in budget authority request of only $151 million. Budget outlays for FY 1983 would actually increase from $525 to about $700 million and thus work contrary to our efforts to balance the FY 1983 budget. This results from spending the additional $350 million in budget authority that would be needed plus spending the end of FY 1982 commitments.

GAO recognizes that termination of GCEP will require DOE to purchase more electrical power than currently planned in DOE's enrichment operating plan. GAO states (page 36) that purchases of this additional power would not require appropriations because these costs are recovered through the enrichment services price. This statement is specious and misleading. All enrichment costs are recovered in the enrichment selling price including GCEP costs. In fact, in FY 1983 despite a funding request of about $600 million for GCEP, the net uranium enrichment budget request is negative by about $66 million. GAO ignores this reality. DOE projects that enrichment revenues will be adequate to fully offset budgetary requests for the entire enrichment program, including GCEP, in the future. However, as noted earlier, if GCEP is terminated, FY 1983 revenues will decrease by $112 million, and budget outlays will actually increase by about $175 million.

Future budget requests will be substantially higher than currently planned due to large additional power purchases, and additional loss of market share resulting from the cancellation of GCEP. Thus it cannot be categorically stated that appropriations will not be required to offset the increased costs of power to the diffusion complex as GAO alleges.

Over the longer term, DOE must maintain an assurance of adequate production capacity to meet contractual demand. In our present operating plan, which assumes GCEP, we are able to significantly reduce power purchases needed to operate the GDP's in the mid 1990's and later. If a decision is made to terminate GCEP and rely on AIS, given the current status of AIS, we would have to assure an adequate power supply in the 1990's. Thus, we would need to sign power contracts in the near future because of the very long lead times needed for the quantities of power required by the GDPs. This would put DOE in a position of being liable (as we are today) for payment of capacity charges for GDP power if AIS is successful. Of course, is AIS is unsuccessful, then the GDP would be our only capacity and clearly we would be at a major price disadvantage against our competitors.

The analysis of DOE estimates (page 37) for the first GCEP increment versus full GCEP capacity for existing diffusion plant is not correct. Analyses of this nature must recognize the forward cost of GCEP, the sensitivity of gaseous diffusion plant cost to the size of incremental capacity, the impact of escalation on both gas centrifuge and gaseous diffusion production costs, and the probability of power costs escalating at a greater rate than the general economy. The unit costs of a two-building GCEP can be significantly less than existing gaseous diffusion capacity. For example, the incremental costs of production from a two-building GCEP in the mid-1990's using advanced technology would be about 60 percent of that from equivalent diffusion capacity assuming a general inflation rate of 9 percent/year.

Miscellaneous Comments

P. 1, Para. 3 - $2 billion program should read $1.5 billion program to improve the efficiency and expand the capacity of the three gaseous diffusion plants.

P. 2, Para. 2 - Reference is made to DOE developing three advanced isotope separation enrichment technologies. A decision was announced on April 30, 1982, selecting one concept for further development.

P. 4, Para. 1 - In reference to the April 1978 decision, the plant completion should be shown 1993 rather than 1994. In reference to the current schedule, the report should indicate that full plant completion slipped to 1994 due to past budget cuts.

P. 36, last para. - Regarding plans to complete the first two process buildings, the date should be 1989 rather than 1988.

## FUTURE OF NUCLEAR REACTORS

Chairman HATFIELD. I have many other questions, but let me defer to my colleague, Senator Schmitt, for any questions he might have.

I assume you have had time to read the 75 pages of testimony? [Laughter.]

Senator SCHMITT. Oh, yes; I got through it in a hurry. [Laughter.]

Chairman HATFIELD. The Secretary did an excellent job of summarizing the testimony.

Senator SCHMITT. I apologize for not being here, Mr. Chairman.

Mr. Chairman, you and I probably disagreed for some time on the potential of nuclear power, but I do not think very many people can disagree that we have not handled it very well since its inception, in particular I think it is very unfortunate that we were persuaded by Mr. Rickover and others to move the light water reactor onto land out of the sea. Amphibians did not last long, geologically speaking, and maybe they will not last very long in the nuclear power business.

Nevertheless, we do have a large number of light water cooled reactors. The reactors were designed with the large tanks of the taxpayer behind them, and are quite advanced in their use of technology, and in a variety of other features.

However, the powerplants that they are surrounded with were not designed with the 21st century in mind, and in my judgment, I think it has been borne out by the fact that with the various incidents, the problem with the plants are problems of the plants surrounding the reactors. The wires and pipes and operators and displays, and other things that cause problems; in Three Mile Island, we found that if we put enough of these together, we could finally damage a reactor. Prior to that, that had not happened.

Mr. Secretary, how are we doing in going back into the existing plants of commercial nuclear power and weeding out where we can the problems of plant design in contrast to the reactors?

Dr. **Brewer**. Senator Schmitt, we have, as you may know, an effort underway, largely sponsored and directed by the private sector. We have some involvement in it—INPO and an effort at EPRI, and the title of the organization escapes me just now, but it will come to me in a second.

They are intensively examining the design of light water reactors with a view toward simplification and ease of operations and improving the man/machine interface.

We, too, are doing some work in this, and we are cooperating and coordinating with INPO and the EPRI. They have found some 300 or 400 improvements that can be made, and they feel these should be made—such as licensing regulations that are now on the books, which they feel do not contribute to safety. These plans have become so complex, largely due to excessive regulations, that they feel the plants are not more safe, but less safe. But at any rate, they are safe enough.

Senator **Schmitt**. Well, the Chairman might be interested to go back to 1974 when I tried to get a joint effort between NASA and the AEC going to work on this very particular problem of modernizing the technology and management philosophy of commercial powerplants. The view of the analysis of plant failures are the failures of wires and valves and operators and training, and not reactors.

Unfortunately, the AEC did not see fit to do that, because they were concerned about public perception that there might be a problem.

Now, I think with Three Mile Island there has been some progress, but your answer has not made me fully comfortable, and we will ask some further questions for the record.

## High-Temperature Gas Reactor

One answer at least for future powerplants is to go to a far simpler land-based design—air breathing, so to speak—a gas reactor system.

What does the budget contain this year for high-temperature gas reactor systems?

Dr. **Brewer**. The administration's request for fiscal year 1983 is zero for the HTGR.

Senator **Schmitt**. Once again?

Dr. **Brewer**. It has been zero for the past 5 years.

Senator **Schmitt**. Still depending on Congress to keep it going; is that correct?

Dr. **Brewer**. Well——

Senator **Schmitt**. How in the world can the administration continue to do that, to justify ignoring a fundamental new technology that has tremendous things over what we are doing today?

You do not have to answer that today, but I just cannot believe it.

Dr. **Brewer**. I quite agree with you on the safety features of the HGTR, such as a large thermal sink in graphite. It is practically idiot-proof.

Senator **Schmitt**. It is far simpler, environmentally, from a standpoint—it has far and fewer problems. Name me one thing that is wrong with high-temperature gas reactors in general?

Dr. BREWER. The one thing wrong, Senator, is that they have not been commercialized.

Senator SCHMITT. But there is a good base of technology and they will not be commercialized unless we start to make it possible for that to happen.

Dr. BREWER. Well, our request——

Senator SCHMITT. We will dig into that some more.

## URANIUM SUPPLY INDUSTRY

My next interest is the uranium industry itself.

In your testimony you say:

> Although there will be continued and probably increasing use of foreign uranium in the United States, we expect United States buyer preference for domestic uranium to continue.

Then you note the difficult situation facing the uranium industry, and you state:

> After the adjustments are completed, the companies that remain as domestic uranium producers should comprise a viable industry.

Now the evidence is, however, that company after company is going under, closing down their operations in the United States, while as I understand it, we still see some increase in foreign imports.

Could you provide us with the number of domestic uranium producers that remain today and how many you expect to remain?

Dr. BREWER. Yes, sir, Senator, we will provide that.

I would like to point out, Senator Schmitt, that the problem is not the importation of uranium; the problem is that the nuclear reactor industry is down; there have been no orders for the past 4 or 5 years, which the Chairman has pointed out.

[The information requested follows:]

### URANIUM PRODUCTION PLANTS

There are 32 uranium processing plants operating at this time that produce uranium concentrate. The production from these plants is expected to be in approximate balance with the projected annual requirements of the domestic utilities.

## URANIUM IMPORTS

Senator SCHMITT. I am well aware of that, but we still import yellowcake.

Dr. BREWER. Have we imported any yellowcake recently?

Mr. VOIGT. Let me provide you, Senator Schmitt, with some of the statistics on this.

For example, in 1980, the allowable amount of imported uranium that could be enriched for domestic end use was 30 percent—and the actual use was 10 percent.

In 1981 it was 40 percent; the actual was 10.1 percent. Of course, this year we do not have the data yet. However, the amount of uranium that could be enriched versus what actually was enriched was a small percentage. So as Dr. Brewer pointed out, we do not think this has a significant effect upon viability of the industry at this particular point in time.

Senator SCHMITT. Except that we have mines closing in the United States.

Mr. VOIGT. That is right.

Senator SCHMITT. And you do not think importation of uranium has anything to do with the domestic economics?

Dr. BREWER. Very minor impact, Senator. If you were, in my opinion, to declare a total embargo on imported uranium, it would not improve the circumstances of our domestic uranium industry significantly.

Senator SCHMITT. Mr. Chairman, I will include in the record some factual data on the closures that have occurred, or are soon to occur, and the number of workers, which is 6,000, that seem to have been laid off.

I agree there will not be a major upswing in the uranium industry until we make a decision that we can have a safe and wise use of commercial nuclear power.

You will forgive me if I find it hard to believe that we still import yellowcake while we are shutting our mines down, and I believe under section 161–V of the Atomic Energy Act, we are charged with insuring that there is a viable industry. Your statement, I guess, is that you think that is still occurring and will occur no matter what happens with imports?

Dr. BREWER. Senator, I believe section 161 requires that we monitor and determine the viability of the uranium industry, not to insure its viability——

Senator SCHMITT. So it only requires you to watch it go down; is that right?

Dr. BREWER. That is the statutory——

Senator SCHMITT. That is the way you interpret the law.

Mr. Chairman, I will have a number of questions for the record on this and other subjects. Thank you.

Chairman HATFIELD. Thank you, Senator Schmitt.

Mr. Secretary, Senator Schmitt and others who were not able to be present today, will have questions to present to you that we would like to have you answer for the record.

Senator SCHMITT. Mr. Chairman, would you yield a second?

Chairman HATFIELD. Yes, Senator Schmitt.

## GAS CENTRIFUGE ENRICHMENT PROJECT

Senator SCHMITT. I want to associate myself with your concerns over GCEP. I think your points are well taken, and we should take a look at that in light of other things coming along.

## HIGH-TEMPERATURE GAS REACTORS

Chairman HATFIELD. I could not help reflect on the Secretary's response to your question about naming one bad thing about the HTGR and he responded that it was not commercialized. We might go back and ask the Secretary if the Clinch River Breeder Reactor is commercialized?

Senator SCHMITT. This whole technology, I think—some day you and I can sit down and explore it, because it tends to mitigate many of the concerns you and others, and including myself, have about the way commercial power industry has——

Chairman HATFIELD. There is no question about it, including the breeder technology. I have never ceased to be amazed at how shortsighted we were in the early days—and I realize this is with 20/20 hindsight—when we talked ourselves into a light water system.

Senator SCHMITT. We might have an informal meeting sometime where we can invite the Secretary and some of his staff up and sit around with a sack lunch to talk over some of these things.

Dr. BREWER. We would be pleased to do that.

Chairman HATFIELD. Sometimes that is more helpful than the formal hearings.

Senator Huddleston.

### UNION CARBIDE CONTRACT OPERATION—PADUCAH, KY.

Senator HUDDLESTON. Thank you. I just have a few questions of a parochial nature, having to do with the announcement last week by Union Carbide that it will terminate its contract to run the gaseous diffusion plant at Paducah, Ky. I am wondering under that contract, how much time do you have to find another contractor and effect an orderly transition?

Dr. BREWER. Senator, the contract for Union Carbide expires, I believe, in the fall of 1983. Carbide has offered to extend for another 3 years, during the transition period, while we find another contractor. We now have this matter under review, and as far as the continuity of operations in Kentucky, I can assure you that they will not be affected by a change in contract.

Senator HUDDLESTON. Do you expect there to be any impact on the employment there?

Dr. BREWER. Mr. Voigt?

Mr. VOIGT. No, we do not, Senator Huddleston.

Senator HUDDLESTON. What about the time frame for securing of a new contract?

Mr. VOIGT. Well, as Dr. Brewer pointed out, the existing contract does not expire until September 1983, with the offer to extend it for an additional 3 years. So we have a sufficient period of time to work out whatever mismatch there may be in insuring that we have a continuity of operation at Paducah, which we intend to do.

Senator HUDDLESTON. Would you, during this process, be in contact with, or take into account the local situation there? You may be aware that this is the largest plant or largest employment source in that part of Kentucky. And naturally, the local leaders are quite concerned, and there is some apprehension as to how this process will develop and what the impact might be. It may be very helpful to have some liaison or contact with the appropriate officials to assure them that things are going forward.

### FUTURE DIRECTIONS IN URANIUM ENRICHMENT

Dr. BREWER. Yes, sir; we will certainly do that.

Senator HUDDLESTON. Could you project for us what you expect to happen with uranium enrichment activities over the next 20 years in terms of improved technologies, and where the Paducah facility may fit into that picture?

Dr. BREWER. Yes, sir.

As you know, we have three gaseous diffusion plants in our complex. Beyond that we are now constructing a gas centrifuge plant in Portsmouth, Ohio, and that with an on-line date for the first two buildings of 1989, and the total complex in 1994.

Beyond that, we have under development the advanced isotope separation processes.

The capacity of the three diffusion plants and the gas centrifuge plant is exhausted. I mean it is saturated, if you will. We have contracts, domestic and foreign, to use the entire diffusion complex plus the entire centrifuge complex.

Now, of course, some of these contracts are faulty, we do not expect all of them to be fulfilled; we expect further terminations.

But even if that were not the case, we still see a robust market in the 1990's for enrichment services.

Senator HUDDLESTON. So it will continue to play——

Dr. BREWER. Senator, I would like to say one other thing, if I may, and announce that on May 10, Egypt signed three new contracts with our enrichment organization. The total contract value for these three contracts is $1.5 billion.

Senator HUDDLESTON. That is a pretty substantial order if you can pick one of those up every day and keep it going.

Thank you very much, Mr. Chairman.

Chairman HATFIELD. You are entirely welcome, Senator Huddleston, thank you.

## CLINCH RIVER BREEDER REACTOR

### ACCELERATED LICENSING DECISION

Mr. Secretary, the Nuclear Regulatory Commission recently voted 3 to 2 to deny DOE's request for an exception from the normal procedures so that site preparation activities could begin at the Clinch River project.

Can you tell us, briefly, why NRC denied this request?

Dr. BREWER. Senator, I will express a personal, not an official, view of the matter.

I believe the vote was purely political in nature, and did not reflect the merits of the case.

Chairman HATFIELD. Well, Mr. Secretary, Commissioner Aherne, I believe, has supported the nuclear program over the years, much to my distress, and voted against the exception, and stated in his written views that DOE's presentation "failed to make the public interest case and, in the cost area, badly."

Why did DOE have such a problem justifying this long-standing project?

Dr. BREWER. Senator, the issue that Commissioner Aherne quarreled with us on was the cost savings due to acceleration of the project. We were arguing that accelerating the project, getting it done in off budget, would result in a cost savings to the taxpayer.

To me and to my other project managers that I know, it is sine qua non; it is obvious.

We did quantify the cost savings, and the minimum cost savings under the most acutely adverse assumptions were $28 million.

On the other side, it was well over $100 million to accelerate by 1 year.

Chairman HATFIELD. I presume you would agree this ruling was a real setback for the Clinch River project?

Dr. BREWER. It was a great disappointment, Senator. We had intended to fast-track the entire Clinch River project from a reference critical date of 1990 to 1988; one of the factors in this strategy was to cut a year or 18 months off the front end of the schedule by being able to be on-site this spring rather than 18 months from now.

The Commission, I must add, did find that the environmental impact was negligible, and it was regressible and it did not foreclose alternative uses of the site.

Chairman HATFIELD. Now that Commissioner Bradford has left the NRC, I believe a new appointment will be made shortly.

Do you expect a reconsideration of this issue, and perhaps a different outcome in the decision?

Dr. BREWER. Senator, we are reviewing our options on how we proceed now legally in the licensing arena. We have not as yet determined whether we will apply for a reconsideration or not.

As time goes on, the advantage of the 50.12 request diminishes.

I would like to point out that we are, in parallel, proceeding along the classic licensing path for a construction permit.

## UTILITY COST SHARE FOR CRBR

Chairman HATFIELD. I believe originally that the utilities cost share was to be about 50 percent, and that has gradually diminished to about 10 percent.

As you know, last year the Senate came within two votes, I believe, of demanding an increase of utility share of the cost.

In view of last year's action, I can assure you there will be additional efforts made to try to require more sharing by the utilities.

Dr. BREWER. Yes, sir.

Chairman HATFIELD. What are you examining regarding future funding options other than Federal appropriations, and do you see the utilities agreeing, voluntarily or someway working out an agreement, to contribute substantially more money?

Dr. BREWER. Senator, I quite agree the utilities' share of the project should be increased, and increased quite substantially.

At the time the project was authorized, the utility contribution was about half of the project. Of course, due to the delays in the past few years, during the Carter debate in particular, the cost estimate has risen drastically; so, as you say, the utility share is a smaller amount.

We are examining or discussing with the utilities a voluntary increase in their role in the Clinch River project.

Chairman HATFIELD. Do you have any preliminary evidence of their response to this proposal or this urging to increase their participation?

Dr. BREWER. The response I have personally received is favorable. They do have problems with their local public utility commission in trying to get such expenditures into the rate base. But I am hopeful that we can increase their share substantially.

Chairman HATFIELD. Mr. Secretary, I wonder if we could impose upon you. There is a vote on now. I have other questions I will submit to you in writing.

However, Senator McClure of Idaho is very anxious to present a few questions to you in person. Would you be willing to wait for 10 minutes or so?

Dr. BREWER. Yes, sir; we would be happy to.

Chairman HATFIELD. In the meantime, we will declare a short recess, and Senator McClure will return to ask some questions.

[A brief recess was taken.]

Senator McCLURE [presiding]. The subcommittee will come to order.

Mr. Secretary, I thank you very much for making yourself available even during periods of time subject to the delay with the actions on the floor.

Senator Hatfield indicated that he had requested you stay so that I might be able to ask a question or two, and I have to tell you that I have a series of questions, and I do not have time to ask them all, because we are going to have to go back to the floor and vote on other amendments related to the defense authorization bill—there are some 25 amendments pending.

Dr. BREWER. We are happy to be here and are pleased to answer your questions.

Senator McCLURE. Thank you.

Mr. Secretary, in your testimony you state, and I quote:

> We have directed our research and development to the few large national objectives with which we have been charged. We believe strongly that the resulting, sharply focused programs are both technically sound and cost effective. Our fiscal year 1983 budget proposal eliminates program elements that are not directly related to our major objectives.

## HIGH-TEMPERATURE GAS REACTOR

A review of the authorization and appropriation request indicates that no money has been requested for the high-temperature gas reactor program.

I know that you are aware of the unique potential this has to serve market areas that require very high temperature operations for process heat and for use in generating electricity in water short regions, and although a firm commitment by industry for a lead plant has not yet come forward, it would appear to me the attractiveness of the technology ought to merit some continued support; and I wonder if you could make a comment with respect to that?

Dr. BREWER. We will be happy to, Senator.

I quite agree on the technical attributes of the HTGR. HTGR offers an objective that water reactors and metal reactors cannot reach, that is very high temperature applications, and it has been the Department's view for many years that HTGR should be developed toward those unique applications—nonelectrical applications that the other reactor and coolant types cannot reach.

It also has a very attractive safety feature, that is a very large heat sink in the core, the graphite. It is a very fine reactor concept, and in fact one could consider that it was indeed commercialized by the mid-1970's. There were 10 reactors ordered by the utilities, but the orders were withdrawn subsequently to that, and that is where we now are.

Senator McCLURE. There are those who have commented if you could have run a submarine with a gas cooled reactor, it would have had the HTGR today.

Dr. BREWER. Yes, sir; there is a body of thought—and this is not necessarily my opinion or the Department's opinion—that perhaps the first reactor type we should have commercialized in this country would have been the gas reactor rather than the PWR—the technology which was spun off from the Navy.

Senator McClure. I think we all know the contributions that Naval propulsion has made to the entire field of nuclear power and the peaceful uses of nuclear energy.

I think too often we forget what originated as a military program was expanded in the Eisenhower administration in the Atoms for Peace program, which also led to the notion that the United States was going to lead in the efforts to provide peaceful atomic power to the developing world, and when he said that before we were talking in terms of national energy crises. He said that before the emerging third world countries had such great increases in their energy costs.

And I have a strong feeling that he would say it even more strongly today in the face of those events.

## IMPACTS OF NONPROLIFERATION POLICY

At the same time, in recent years, we have had conflicting goals with respect to nuclear nonproliferation. You make some reference to that—to that question in your testimony, and I wonder if in the nonproliferation strategies that have been debated, if we have not policed nuclear technology to the point both our leadership role and the attractiveness of our product in the world marketplace have suffered?

Dr. BREWER. Yes, sir; I agree with that notion. In fact, in my confirmation statement, Senator, I asserted that the nonproliferation strategy of the previous administration, in my view, was quite counterproductive.

For one thing, we lost our position of strength in international nuclear commerce. For another thing, we angered other advanced nuclear nations. Many of them were our allies.

Third, we drove the third world, nuclear importing nations, to our competitors. And fourth, we sacrificed a national or international option, or came close to it.

Senator McCLURE. Mr. Secretary, I appreciate your answers to those questions.

I have many more questions to ask for the record, and I will not do that at this time, but I will submit them to you for comments in writing.

I appreciate the leadership you have given in this field and the efforts that the Department of Energy has made under Secretary Edwards, and I certainly have to recognize and should recognize the strong support President Reagan and his entire administration have given in these programs.

### FEDERAL R. & D.

I have expressed so often that it hardly bears repeating, a view that there are areas in which the Federal Government should be involved in terms of research and development, and demonstrate where the financial risk and capital requirements are so great that private enterprise is not likely to make those investments unneeded or unassisted; and yet the opportunities for reward are so great that they ought to be made on behalf of the public.

I have a strong conviction if we do not move forward to diversify our energy sources and conception in this country, that we may indeed regret that in future years. And that is particularly true in long-lead time items that cost a great deal of money; it is also particularly true in capital intensive industries, where the initial cost is the major cost and fuel costs decline.

### COSTS OF ELECTRIC POWER

I have heard it stated that though industries in the Midwest that are 50-percent dependent upon nuclear power for their electrical generation within the utility system, find that the power produced and marketed from the nuclear powerplant is 50 percent of the cost of electricity produced from a new coal-fired plant.

Is that a statistic with which you would agree?

Dr. BREWER. I think that sounds about right, Senator. I would like to provide an answer for the record, but over the past 5 or 6 years, nuclear power has been quite competitive with coal. It has had a substantial advantage over the past decade, let us say, in terms of life cycle cost, mills per kilowatt. In spite of the increased capital cost of nuclear plants, we forecast that they will remain competitive in the coming decade.

Senator McCLURE. I think it was the president of Commonwealth Edison who made that comment at a meeting in Kansas City not long ago, it startled some of the people who heard him say it, because he has both nuclear plants and new coal fired plants within his utility system.

Now that comparison is not totally fair, because he is comparing an older plant in which the capital costs were fixed at an earlier date with a new plant in which fuel costs are the highest elements, but so are capital costs.

But nevertheless, it is a striking comparison that flies in the face of what the public has been led to understand about the cost of nuclear power.

### COSTS OF NUCLEAR WASTE

I also appreciate the support of the administration in our efforts to deal with the disposal and storage of radioactive waste, the interim and AFR bill which has now passed the Senate and is pending in the House. That bill contains within it internal, complete internal recovery for the system; is that not correct?

Dr. BREWER. Yes, sir; and as you know, the President and the Department have strongly supported your bill, S. 1662.

Senator MCCLURE. I very much appreciate that, and the point we need to drive home is that while many people are critical of the cost of nuclear power, and if you, say, look at all the life cycle costs including taking care of all those radioactive wastes and decommissioning the plant, it will be more expensive.

The estimates are that that will cost 1 mill per kilowatt-hour to take care of those costs.

Dr. BREWER. Or less. And that is a small amount of the total cost of 30 to 40 mills per kilowatt-hour for nuclear-generated electricity.

### NUCLEAR SAFETY ISSUES

Senator MCCLURE. I also want to compliment you on your effort to educate the public about the safety of nuclear waste. We were joking a little during the debate on the nuclear waste bill, because the salt dome States were fighting the granite States, each of which did not want the honor of being the one selected.

But it can be said with some truth that the granite States would pay less than the salt dome States, because the granite is radioactive already, and the salt is not yet.

I do not know whether that contributes much to the dialog, but we have fun with some of our Senators from the States who do not seem to realize they are walking around in more radioactivity than was at the fence at TMI.

Those kinds of comparisons the public needs to be made aware of in order that they can make a judgment based upon factual information, and you have contributed a great deal in that area.

Dr. BREWER. Thank you.

### ADDITIONAL QUESTIONS SUBMITTED FOR THE RECORD

Senator MCCLURE. Thank you very much, Mr. Secretary.

We will submit some questions for the record, and we will appreciate your responding for the record.

Dr. BREWER. Yes, Senator.

[The questions and answers follow:]

## QUESTIONS SUBMITTED BY SENATOR HATFIELD

### Role of Federal Government in Commercial Nuclear Power

Question: The Department's budget justification includes a section entitled "Goals" and under that section, there is a discussion regarding the changed role of DOE in deployment of Light Water Reactors. The material indicates that DOE's role will include activities to improve utility financial condition and utilizing research results to reduce cost and economic risks.

Answer: Title I of the Energy Reorganization Act (P.L. 95-91) includes, under Section 102, a number of purposes which reflect the need for the Department of Energy to consider activities to improve the financial condition of utilities in the United States and to provide research leading to reduced costs and economic risks. Those considered most pertinent to the need for such activities are:

o to provide for a mechanism through which a coordinated national energy policy can be formulated and implemented to deal with the short-, mid-, and long-term energy problems of the Nation; and to develop plans and programs for dealing with domestic energy production and import shortages.

o to promote the interests of consumers through the provision of an adequate and reliable supply of energy at the lowest reasonable cost.

o to assure, to the maximum extent practicable, that the productive capacity of private enterprise shall be utilized in the development and achievement of the policies and purposes of this Act.

o to foster insofar as possible the continued good health of the Nation's small business firms, public utility districts, municipal utilities, and private cooperatives involved in energy production, transportation, research, development, demonstration, marketing, and merchandising.

o to carry out the planning, coordination, support, and management of a balanced and comprehensive research and development program.

For financial reasons, many utilities have not been able to make decisions consistent with optimum use of natural resources or which will meet long-term energy and capacity needs. Regulation, particularly of nuclear plants, which has increased at an alarming rate, delays construction and licensing of needed new plants. Cost escalations, coupled with construction delays and the regulatory lag in public utility commission proceedings on rate adjustments, have greatly weakened the financial health of the utility industry.

Consequently, that industry has been unable to modify old plants or introduce new ones to minimize use of costly fuels like oil and gas and even to provide sufficient generating capacity to ensure reliable service to all sections of the country during the next decade.

In order for the Federal Government to be in a position to meet future electrical needs and to assure a healthy national economy, the Department of Energy must take action to determine what can be achieved in terms of regulatory and associated economic reform to assure a viable utility industry. If this is not done, there is serious question as to our ability to provide to our citizens an adequate and reliable supply of electrical energy at the lowest reasonable cost.

Although the ordering of new plants has stopped, the lessons being learned from the operation of over 70 plants and the construction of over 50 more are leading to continued needs for research in selected areas leading to the modification of plant systems, the improvement of operating procedures, and more comprehensive training of plant personnel. In general, the financially regulated nuclear utilities cannot afford this research on an individual basis and so have banded together in support of the Electric Power Research Institute, the Institute of Nuclear Power Operations, and Owners Groups of similar plants. The Federal Government through the Nuclear Regulatory Commission and the Department of Energy have a role of not only planning and coordinating the improvement of nuclear power safety and economy but also of stimulating this activity through selective investigations through the national laboratories and contractors. This role was reinforced by the Congress in Public Law 96-567, the "Nuclear Safety Research, Development, and Demonstration Act of 1980," in Section 2(a) of which the Congress found that...(4) a proper role of the Federal Government in assuring nuclear powerplant safety, in addition to its regulatory function, is the conduct of a research, development, and demonstration program to provide important scientific and technical information which can contribute to sound design and safe operation of these plants.

Question: How much is included in the 1983 budget to initiate the programs to accurately inform the public of the facts concerning nuclear power? How does this compare with similar activities over the past 5 years. Specifically, where in the budget are these funds located?

Answer: Consistent with guidance from the Office of Management and Budget, the Department's FY 1983 budget request does not specifically identify funds for nuclear public information. Accordingly, no funds have been allocated to that activity by name in the budget.

Under our statutory authority and responsibility to conduct a public information program (P.L. 95-91, Sec. 102 (5) (D); P.L. 93-438, Sec. 103 (8)) we anticipate the funding level for these activities in FY 1983 to be approximately the same as in FY 1982. For FY 1982 the expected funding is:

(a) General nuclear information - $1.5 million
(b) Waste Management - $800,000 ($1 million for FY 1983)
(c) Breeder - less than $100,000
(d) Uranium enrichment - $85,000 ($50,000 for FY 1983)

In the previous 4 years, there was no general nuclear information program in the Department. Program-specific activities were about equal to the levels shown for FY 1982.

## Breeder Technology

Question: Although the Liquid Metal Fast Breeder Reactor (LMFBR) program remains the single largest item in your budget, you propose to refocus the base program. Can you briefly describe this consolidation both in terms of operating expenses and construction activities?

Answer: The base program in FY 1982 involves 23 contractors including seven Government-owned contractor-operated national laboratories; five industrial contractors known as reactor manufacturers; and eleven others such as universities, small specialized high technology firms, and other agencies of Government through interagency agreement.

The consolidation action for FY 1983 reassigns some 12 of these task efforts, generally in the $100-$500 thousand range, to the remaining 11 mainstream national laboratories and industrial contractors. The impact on total funding for the two laboratories affected should be a minor fraction of their total budgets. Although the consolidation reduces the breadth of program participation, it should enable more efficient program management, better focus on tasks critical to industrialization, and getting the most from our resources.

From a program overview perspective, the FY 1983 base program request is a total of $270 million compared to $340 million in FY 1982. Making allowance for escalation, the reduction in funding requested is about $106 million. Intensive efforts are underway to complete the 12 task efforts mentioned above in FY 1982 at least to a stage that enables orderly disposition; i.e., termination as completed work or reassignment, as governed by the status and priority of each task effort.

The base program operating budget request reflects a general reduction of $57 million from FY 1982 levels unescalated. While the reductions are across the board, the principal impacts are in:

- FFTF - reflecting reduced technical support requirements due to completion of construction and prestartup testing and a transition to normal operation.

- Fuels - reflecting the success of the mixed oxide fuel system for FFTF and Clinch River service and a less emphasis on high-gain breeder performance in the near term. Emphasis is now on secure-automated fuel fabrication and solution to the clad swelling characteristics of current alloys.

- Safety - reflecting successful completion of SLSF testing and awaiting completion of the high-priority TREAT Upgrade Project. Near-term emphasis is on common effort required for CRBR licensing and any industrial initiative for a commercial sized plant.

- Test Facilities Operations - reflecting completion of safety loop testing in the Engineering Test Reactor, a number of small test facilities supporting FFTF, and a reduction in planned post-irradiation fuel examination coupled with a consolidation of these operations at existing facilities at Hanford, Argonne-Idaho, and Los Alamos, New Mexico.

Within the base program, the construction request is for $18.3 million compared to $62 million in FY 1982. Dominating this reduction is the request, now before the Congress, to descope the Fuels and Materials Examination Facility at Hanford in view of the reduction in planned post-irradiation fuel examination, particularly in high-gain advanced breeder fuels. The proposal is to defer indefinitely the acquisition and installation of exam equipment pending programmatic need, and to proceed with the acquisition and installation of the high-priority SAF line for fabrication of FFTF and CRBR fuel. In addition to needed fuel fabrication capacity, the SAF line is crucial to reducing personnel exposures and assuring material safeguards and accountability, both critical preconditions to industrialization.

The FY 1983 request provides for the TREAT Upgrade project, modifications to ETEC for component testing, safeguards and security improvements, and upkeep of sites for which the Breeder program is responsible.

## Clinch River Breeder Reactor

Question: In preparing the FY 1983 budget request, when did you expect to be in a position to start site preparation on the Clinch River Site?

Answer: At the time of final preparation of the FY 1983 budget request, it was expected that the Nuclear Regulatory Commission (NRC) would approve the Department's request to begin site preparation activities in March 1982.

Question: Even without the exemption--under a limited work authorization from NRC, how soon could you begin site preparation work?

Answer: A limited work authorization for the project is expected in March 1983. This would permit site preparation activities to begin in April 1983.

Question: The supporting 1983 budget request for the CRBR states that "Site preparation and construction of support and service facilities will be continued in FY 1983 as authorized by NRC." Assuming NRC had approved DOE's request, what activities had DOE planned to undertake from March 1982 through the remainder of the fiscal year? How much had DOE planned to spend on these activities in FY 1982?

Answer: If the NRC had approved the Department's request to start site preparation in FY 1982, the following activities would have been started in FY 1982: 1) the harvesting of timber; 2) site clearing, grading, and excavation; and 3) construction of the access road and railroad, the quarry, the off-site warehouse, and holding ponds. These activities would have been continued in FY 1983. The conduct of these activities would have required approximately $57 million in budget authority in FY 1982.

Additional utility contributions would have been provided in FY 1982 if site work had begun.

Question: What total amount of funding is included in the 1983 budget for continuation of site preparation and construction of support and service facilities related to the CRBR?

Answer: Approximately $24 million in budget authority would have been required to continue site preparation activities and to construct support and service facilities in FY 1983.

With respect to this and the preceding question, it should be noted that detailed estimates of FY 1982 and FY 1983 funding required to support the overall project based on the start of site work in March 1982 were in the process of being developed at the time of submitting the FY 1983 budget request and the potential requirement for additional FY 1983 funding was recognized. A potential source of this additional funding was the additional utility contributions which might have been made available by the utility industry if visible progress were made in obtaining NRC approval to conduct site preparation activities.

It should be emphasized that the current FY 1982 appropriation and FY 1983 budget request are in line with our current plans to begin site work in April 1983.

## Secure Automated Fabrication (SAF) Program

Question: In light of NRC's recent decision on the CRBR project, will the $10 million requested in the 1983 budget to maintain the Secure Automated Fabrication line scheduled to meet fuel requirements associated with the CRBR be needed and if so why?

Answer: The $10 million referred to will be needed to complete the Secure Automated Fabrication (SAF) line. The SAF line will be the only source of mixed oxide fuel for the Fast Flux Test Facility (FFTF) and the CRBR project. The FFTF will require additional fuel and the CRBR project will also require fuel in the 1988 and 1989 time frames, respectively. Deletion of the $10 million would foreclose the possibility of meeting either or both of the above fuel requirements.

## Large Development Plant

Question: I believe the Large Developmental Plant is the step after Clinch River, a larger breeder demonstration plant that could possibly lead to commercial use of breeder technology. Is this correct? What would be your estimate of the cost of this demonstration plant?

Answer: We expect that the construction and operation of a large scale breeder demonstration plant will lead to commercial use of the breeder. The large plant will provide information and experience essential to future decisions by industry on full commercial deployment of the breeder.

The most recent estimate of the large developmental plant, expressed in 1982 dollars, is $3.1 to $3.3 billion. This estimate was completed in April 1982 and includes the cost of design, equipment and construction. Net revenues from the plant over its operating life are estimated to approach $10 billion.

Question: On Page 150 of the budget justification, you state that no design funds are requested for the LDP in FY 1983 because further work is a responsibility of private industry. In the next sentence, you indicate that $15 million will be made available _if_ an international agreement is reached. Can you explain this apparent inconsistency--is the design work a private responsibility or only partially a private responsibility?

Answer: The statement in the FY 1983 budget is an indication of the Administration's firm conviction that any large scale breeder reactor plant to follow the CRBRP should be primarily funded by private industry. Furthermore, this statement was intended as a strong indication that the Department of Energy would not continue to support the preliminary design and implementation planning of a large scale breeder plant unless there was a significant expression of industry interest. However, the FY 1983 budget did indicate that if acceptable cooperative agreements were negotiated, the Department would provide up to $15 million. Cooperative agreements in this context refers to agreements with both the utility industry and with other LMFBR developing nations.

Question: Do you see any interest by private industry in financially supporting this demonstration project?

Answer: Yes, the private sector has, over the past few months, shown a substantial interest in proceeding with the implementation planning for a large scale breeder project. The most significant activities in this regard are the recent formation of a breeder steering group under the chairmanship of John Selby of the Consumer Power Company. Also, a utility owners group (Consolidated Management Office (COMO)) is being formed to represent the U.S. utilities interest in the implementation planning for the project. COMO will be staffed with representatives from the U.S. utilities and from the nuclear industry. We deem this interest by the private industry to be significant enough for DOE to support it in FY 1983.

## TMI Cleanup

Question: With regard to the accident at Three Mile Island, what are the current estimates of total cleanup costs at TMI-2? What is the status of cleanup and what is the federal role?

Answer: The Department has not made its own estimate of the cost of cleanup at TMI. GPU has estimated that it will cost $760 million to complete cleanup of TMI.

The status of the cleanup is that the reactor is in a safe and stable condition. The water in the auxiliary building has been processed by the EPICOR-II system and its radioactivity has been transferred to 50 liners, 49 of which are stored on the Island. The water in the containment building sump has been processed by the Submerged Demineralizer System (SDS) and its radioactivity has been transferred to liners which are also stored on the Island. It is planned to ship one of these SDS liners to Battelle Pacific Northwest Laboratory for research and development on May 21.

Over 60 manned entries of the reactor containment building have been conducted to date. Activities conducted during these entries have included radiation surveys, sample taking, inspection of the polar crane, and removal of selected electrical equipment and instrumentation. In addition, a decontamination experiment has been recently completed.

Planning activities are underway for the remainder of the cleanup including early core inspection, reactor heat and plenum removal, reactor fuel removal and subsequent activities.

The federal role is a limited one to the extent that the Federal Government can bring certain unique experience to bear and to the extent that it can support research of benefit to the Nation as a whole. In this regard, DOE is moving forward in accordance with Congressional authority with a TMI research and development program to provide valuable technological data related to nuclear safety and cleanup and the disposal of severely damaged fuel.

Question: On page 110 of the budget justification you state that the federal role at TMI "is limited to necessary R&D only" and "the cost of cleanup remain with the owner." In your view, do any of the DOE activities, such as the recent proposal to remove the entire core, fall outside of the concept of generic R&D. If so, who will pay these costs?

Answer: The current negotiations for DOE acquisition of the whole TMI-2 core are based upon 1) DOE's role being limited to research and development, in accordance with Congressional authority, to obtain information on the nature and content of fuel damage of great value to the design and operation of commercial reactors, and on disposal methods for severely damaged reactor fuel, providing important R&D contribution to the waste management areas, 2) that costs of shipping, storing and disposal of the damaged TMI-2 fuel that is not associated with the DOE R&D activities will be reimbursed by General Public Utilities, and 3) that the Department will acquire ownership of the damaged core from the owners at no cost to DOE, so that the core acquisition will not lead to an increase in the authorized cost of $123 million for the DOE TMI R&D program.

Question: Will these non R&D costs be paid for initially by the owner, the GPU Company, or will DOE be reimbursed later? Please provide the Committee with a copy of the agreement.

Answer: The agreed principles upon which the negotiations for DOE acquisition of the TMI-2 core have just begun, include reimbursement by the owners for non R&D costs associated with shipping and storage during the 3 to 5 year period of the DOE R&D program and ultimate disposal of the TMI-2 core in a Government repository. A copy of the Agreement in Principle is attached. Negotiations to determine whether the execution of a written contract between DOE and the owners which defines particulars satisfactory to both parties can be completed are expected to take 6 to 9 months.

## Agreement in Principle

## Acquisition of the Damaged TMI-2 Reactor Core by DOE

Whereas, the Owners of Three Mile Island Nuclear Generating Station, Metropolitan Edison Company, Pennsylvania Electric Company, Jersey Central Power & Light Company, all subsidiaries of General Public Utilities Corporation, are desirous of completing the defueling, cleanup, and disposal of waste from the TMI-2 nuclear powerplant in as safe and efficient manner as possible, and

Whereas, it now appears likely that shipment of the bulk of the damaged fuel immediately upon removal from the reactor vessel offers significant advantages from a public health and safety as well as from a cost point of view, and

Whereas, the Department of Energy (DOE) is authorized to conduct a research and development program to examine the damaged reactor core so as to enhance understanding of degraded core performance and thereby contribute to nuclear reactor safety on a generic basis, and

Whereas, acquisition of the entire TMI core will significantly enhance the value of the research and development program and its potential usefulness in evaluating generic reactor safety matters:

It is therefore agreed that:

1. The Department will acquire ownership of the damaged core from the Owners at no cost to DOE.

2. The Department will arrange for shipment of the entire core to a DOE site for an examination program. Title to, and responsibility for, the damaged fuel will be transferred to the DOE upon leaving the TMI site boundary.

3. The Owners will reimburse cost of shipping to a DOE site.

4. The Department will fund the cost of interim storage, survey of the core, and selection of samples for detailed examinations, a program expected to take about 3 to 5 years.

5. The Owners will reimburse costs associated with storage (beyond the R&D period referred to in item 4) and disposal, up to a reasonable value to be agreed upon. The cost to be reimbursed shall not exceed that which the Owner would incur in storage of a TMI type core in a TMI-1 fuel pool awaiting ultimate disposition, and for ultimate disposal in a Government repository.

6. This Agreement is contingent upon negotiation and execution of a written contract between DOE and the Owners, which contract shall define the particulars to a degree satisfactory to all parties.

RC Arnold 3/15/82
On Behalf of the Owners

Shelby T Brewer 3/19/82
On Behalf of the Department of Energy

Question: As I understand it, the recent PUC decision in Pennsylvania which allows cleanup costs to be included in the rate base, is contingent on the restart of the undamaged unit at TMI - Unit #1. Would you care to comment on the obstacles to restart of TMI-1. (court ruling and safety concerns)

Answer: The obstacles to TMI-1 restart are 1) the steam generator repairs which GPU has scheduled for completion by the end of this year, and 2) the NRC license to restart, in which the primary issue for the Commission to decide is the psychological impact of restart on the people around the plant.

Question: In view of these obstacles, do you personally feel that the PUC's have moved fast enough or far enough to obtain funds from local rate payers for cleanup costs?

Answer: The Department supports Governor Thornburgh's cost sharing proposal which calls for a very substantial contribution from local rate payers. We do not believe it is appropriate for us to comment on the speed with which this funding is being arranged by the PUC's.

Question: Has there been any slippage or delay in the GPU cleanup schedule that will impact DOE's ability to fully and efficiently utilize $27 million requested in the 1983 budget or the funds provided for the current year?

Answer: No. There has been no slippage in the GPU cleanup schedule that would impact DOE's program. In fact, the schedule of some critical steps is being improved with head removal and preparation for fuel removal to begin in FY 1983.

## LWR Extended Burnup

Question: The budget request cuts all but $3 million out of the LWR subprogram to demonstrate the increased burnup and improved performance of nuclear fuel. In October of 1981, DOE estimated a potential cost savings to consumers of nearly $13 billion from this program. GAO studies later verified this figure. Do you still agree with these estimates, and if so, why close out the program?

Answer: The estimate of potential savings remains valid. The recommendation in the Administration's budget is not to close out the program but rather to complete it through: (1) full demonstration of a single design, and (2) provision of generic design and licensing data. The decision to reduce the effort from the demonstration of multiple designs, as now underway, was made in implementation of the Administration's policy of reducing Federal expenditures and with the expectation that competitive market forces may upon full publication of the Government-sponsored research results lead to other designs being offered by various nuclear fuel suppliers.

Question: By limiting the program in FY '83 to just one fuel vendor aren't you in effect foregoing most of the savings which are possible?

Answer: There is a certain risk that a large portion of the savings would not be achieved, if the various fuel suppliers (including possibly even the one selected for Government support to demonstrate the single design) decide not to offer fuel for fully extended burnup operation in the marketplace. However, we believe that the effect of limiting the demonstration to a single fuel design is more likely to be a delay of several years in achieving the projected savings, rather than not achieving a major part of the savings at all.

Question: How much funding is needed to fully support and carry out the program in FY '83 and the out years? What was the internal DOE request to the Secretary, and the DOE request to OMB?

Answer: The internal DOE request to the Secretary and the DOE request to OMB were both $8.5 million, an amount intended to permit work toward orderly completion of all existing contracts under this program. We continue to support the President's budget request.

Question: I understand that the Heritage Foundation has indicated support for continued funding for this program. What were its reasons and what level of funding was proposed for FY '83?

Answer: On March 5, 1982, the Heritage Foundation published an "Issue Bulletin" entitled "DOE's Extended Burn-Up Program: The Good Atom Misunderstood," which supported continued funding for this program. The four principal reasons cited are quoted as follows:

"1. Because of state regulations controlling the utilities and market imperfections influencing the atomic vendors, the program will not be picked up in a timely fashion by private enterprise."

"2. Although OMB has approved federal support for the program in FY 1983, it has recommended specific cuts that ironically will create the very monopoly power and technology transfer difficulties that the program was designed to avoid."

"3. Not to proceed with this program as originally planned is in effect to place an unnecessary and substantial tax on the American public as well as on the atomic power industry."

"4. One of the program's most important contributions will go neither to private enterprise nor to the public directly, but rather to DOE's efforts to solve the nuclear waste disposal problem."

That document also contains the following statement regarding level of funding: "If the program is to remain on schedule and on budget, $15 million will be needed in FY 1983..." As indicated previously, DOE supports the President's budget request.

## RERTR

Question: In the DOE budget, there is no request for funding of the Reduced-enrichment at research and test reactor (RERTR) subprogram. Last year Congress added funds for this project. Briefly describe the benefits of the program.

Answer: The Reduced-Enrichment for Research and Test Reactors (RERTR) Program is developing needed fuels technology which will make it possible to replace current high enrichment uranium (HEU) fuels, in research and test reactor fuel inventories, with fuels fabricated from low enrichment uranium (LEU, of slightly less than 20 percent U-235 content). Technology developments and planned fuel performance demonstration activities are proceeding in a very positive manner.

If planned budgetary support is continued, applicable fuels and fabrication technologies will be demonstrated and fuel performance demonstrations will be completed in time to facilitate licensing of research and test reactors for use of LEU-fuel (a) for many low power and/or low specific-power fuel applications by 1984 and (b) in nearly all of the higher power and high specific-power fuel applications by 1988.

The major benefit to the United States, from RERTR Program activities, is the ability to (1) continue to supply research and test reactor operators with the enriched uranium they require for fueling their reactors, while (2) effectively eliminating HEU of U.S. origin from fuel inventories (at reactor sites and in-transit) servicing most all of these reactors. A secondary benefit, to all research and test reactors which can achieve their design missions on LEU-fuel, is a significant reduction in the safeguards regulations that will be imposed on the facilities and on their operations. This can constitute a significant improvement in public relations for many domestic and foreign research reactors.

Question: Is there a request for continuation of the program under the Arms Control and Disarmament Agency? How much is the requested amount and what will be accomplished?

Answer: Yes, the ACDA Budget request for FY 1983 is $4,852K (BA) $3,752K (BO); the higher level of (BA) is required to permit initiation of procurement actions for the advanced technology fuel, $U_x$Si-Al, to be delivered in FY 1984 for a full core fuel performance demonstration in a high power research reactor such as the Oak Ridge Research Reactor (ORR).

FY 1983, achievements will include: completion of irradiations in the ORR and initiation of post-irradiation examinations (PIEs) of high U-density fuel specimens and of prototype fuel assemblies of aluminide- and oxide-dispersion LEU-fuels; preparation of procurement specifications for the much higher U-density silicide LEU-fuel, and initiation of procurement actions for $U_x$Si-Al fuel assemblies for a full core demonstration in a high performance test reactor application.

Question: Does this other agency (ACDA) have the capability and expertise to continue the program? Will DOE personnel be involved?

Answer: RERTR Program activities will continue under the aegis of the existing Program Manager, staff, consultants and contractors. Since operational and technical responsibility for direction of programmatic activities at the National Laboratories are assigned to specific Program Divisions of the Department, DOE/NE staff will fulfill its responsibilities and will continue to cooperate with ACDA, in pursuit of program objectives, and to provide whatever administrative assistance and guidance is appropriate for the needs of the related ANL staff.

## Space and Terrestrial Applications

Question: Has there been any slippage in the expected launch date for the Galileo and International Solar Polar missions?

Answer: The NASA Galileo and International Solar Polar missions present launch dates are May 1985 and April 1986, respectively.

Currently there has been no indicated slippage in the present launch dates for the Galileo and International Solar Polar missions.

Question: Update the committee on the schedule for hardware deliveries for the Galileo and International Solar Polar missions which the justification material indicates may be delayed.

Answer: The three flight units which includes the spare for the Galileo mission would be delivered by June 1984. The flight unit for the International Solar Polar mission would be delivered in September 1984.

Question: If the hardware is delayed, what impact will this have on your use of funds requested for 1983.

Answer: Funds would be concentrated on completing the hardware deliveries on the earliest possible schedule.

## Nuclear Fellowship Program

Question: Briefly describe the Nuclear Science and Engineering Fellowship program.

Answer: The fellowship program was developed to provide a means for increasing the supply of appropriately trained, highly qualified engineers and scientists with advanced degrees to implement the Department's nuclear energy agenda. As presently conceived, a fellow would receive a 1 year renewable award for graduate study at a participating university. In addition to pursuit of a regular course of study, each fellow would spend 3 months at an Energy Department National laboratory or other Departmental facility. There, the fellow would participate in nuclear science or health physics research. Finally, each fellow would execute a service agreement which requires employment with the Department or one of its operating contractors if a reasonable offer is tendered.

Question: What is the level of funding support in FY 82 and what is the status of the program including how many fellowships have been awarded?

Answer: We have provided $370,000 in FY 1982 to initiate the program. To date, 12 students have been selected. These students are actively participating in the program. Additionally, we have under review applications from students for the selection of 12 more fellows. When the program is fully operational, we hope to support a yearly total of 36 fellows.

Question: Provide a list of the participating universities and the level of activity at each one.

Answer: Participating universities include:

### Nuclear Engineering

University of Arizona
University of California - Berkeley
University of California - Los Angeles
University of New Mexico
Iowa State University
Kansas State University
University of Maryland
University of California - Santa Barbara
Cornell University
University of Florida
Georgia Institute of Technology
University of Illinois

### Nuclear Fellowship Program

Massachusetts Institute of Technology
University of Michigan
University of Missouri - Columbia
North Carolina State University
Northwestern University
Ohio State University
Oregon State University
Pennsylvania State University
Purdue University
Rensaelaer Polytechnic Institute
University of Tennessee
Texes A&M University
University of Texas
University of Virginia
Virginia Polytechnic Institute and State University
University of Washington
University of Wisconsin

### Health Physics

Georgia Institute of Technology
University of Florida
University of Kansas
Colorado State University
New York University Medical Center
University of Lowell
University of Michigan
University of North Carolina
University of Pittsburgh
Purdue University
Rutgers University

present, the level of activity is small. Those universities
h students include:

### Nuclear Engineering

Massachusetts Institute of Technology (2)
University of Texas (1)
University of Michigan (1)
Pennsylvania State University (2)
Cornell (1)
North Carolina State (1)

### Health Physics

Purdue University (1)
University of North Carolina (1)
Georgia Institute of Technology (1)
University of Michigan (1)

Question: What is the proposed level of funding for FY 83 and what will be accomplished?

Answer: The proposed level of funding for FY 1983 is approximately $600,000. These funds will support the academic training of 36 fellows, and the 3 month practicum experience at a Department facility.

Question: You state that over 70 percent of the amount expended would accrue for direct support of the fellows. What is the other 30 percent used for?

Answer: These costs go for administration of the program. Oak Ridge Associated Universities (ORAU) is the support contractor. Typical cost items include: printing of applications for students and universities; travel costs for advisory committee members from universities; and salary costs for ORAU personnel.

## Terminal Isolation Program

Question: With the $185 million in borrowing authority, there appears to be a large increase in the terminal isolation waste program. Please provide a breakdown of the individual project specific activities which were funded in FY 1982 and FY 1983 and the level of funding for each activity.

Answer: The requested data is tabulated below:

|  | FY 1981 Actual | FY 1982 Approp. ($ in millions) | FY 1983 Request |
|---|---|---|---|
| Project Specific Activities |  |  |  |
| BWIP | $ 37.5 | $ 32.0 | $ 51.0 |
| NNWSI | 29.1 | 43.0 | 60.5 |
| ONWI | 69.5 | 70.7 | 73.5 |
| Subtotal | $ 136.1 | $ 145.7 | $ 185.0 |

Question: Provide also a breakdown of generic research and development activities in FY 1981, FY 1982, and FY 1983 including the funding level for each activity.

Answer: The requested data is tabulated below:

|  | FY 1981 Actual | FY 1982 Approp. ($ in millions) | FY 1983 Request |
|---|---|---|---|
| Generic R&D Activities |  |  |  |
| Transportation | $ 1.5 | $ 1.5 | $ 1.0 |
| Subseabed | 7.1 | 3.9 | 7.5 |
| ONWI | 28.6 | 37.1 | 41.9 |
| Subtotal | $ 37.2 | $ 42.5 | $ 50.4 |

## West Valley Demonstration Project

Question: Briefly, describe the provisions of the cooperative agreement with the State of New York relative to the West Valley Demonstration Project.

Answer: On November 3, 1980, the Department and the State of New York signed a cooperative agreement establishing the framework for the implementation of the Project as provided for in the West Valley Demonstration Project Act. The agreement provides for Department use and possession of the high-level waste and certain facilities at the Center without transfer of title; defines the cost-sharing arrangements between the Department and the State; and commits the Department to provide technical assistance to the State in the joint submission to the U.S. Nuclear Regulatory Commission (NRC) of an application for license amendments or change required for the project. The Department will have the sole responsibility for the Project, including management, planning, and implementation in a manner which protects public health and safety. The agreement provides for State cooperation and participation in the Project, including access for inspecting the site and for observing the progress of the Project.

West Valley Demonstration Project

On September 18, 1981, the Department and the State amended the cooperative agreement. Among other things, the amendment resolved some ambiguities contained in the initial agreement. The resolution of these issues permits the Department to move forward in providing a technically sound approach to demonstrate the solidification of high-level radioactive waste.

Question: What is the total estimated cost of the work and how will that cost be split between Federal and non-Federal interest? How will the Federal cost be spread out over future years?

Answer: The cost of the project will be split with the Federal government paying 90% and the State of New York 10%. This cost sharing arrangement was provided in the West Valley Demonstration Project Act. A total estimated cost of the work is not available but is expected to be in the range of $300 to $500 million. Until the technical, cost, and schedule baselines are established it is not possible to state how the Federal cost will be spread out in future years; however, it is expected that significant funding will be required for several years starting in FY 1984.

Question: What is the schedule for completing necessary system designs and establishing project costs and other schedules?

Answer: A conceptual design will be started during FY 1982 which will establish the technical, cost, and schedule baselines for the project. When the conceptual design is completed in FY 1983 or 1984, we will have completed the necessary work to state with some confidence what will be done, when, and how much it will cost.

Question: DOE has requested $12.4 million in operating expenses for this work in fiscal 1983. A major portion of the proposed work appears to be for repair, replacement and upgrading of existing plant facilities. Why is it necessary to undertake this restoration and upgrading work? What procedures are being followed to insure only that work critical to the demonstration project is performed.

Answer: The facilities and systems at West Valley were designed and constructed in the early 1960's. The facility operated from 1966 until 1972 when it was shutdown for an upgrade program. The facilities and systems have been maintained on a standby basis since that time. The restoration and upgrading work is to ensure the facilities and systems required for operation meet current environmental, health, and safety guidelines and regulations, to factor "lessons-learned" during the last twenty years into facility operation, to correct plant deficiencies, and to prepare the plant for reuse and operation. It is our intent to carry out the project in a safe, technically sound, environmentally acceptable, and cost-conscious manner. Management systems and technical baselines will be in place before significant activities are undertaken. Contractor work and proposals will be evaluated by a full-time Department staff located at the site. Since the State of New York is paying 10% of the costs they have a vested interest in keeping costs down and I am sure they will assist the Department in ensuring only necessary work is performed. Additional audits and reviews will be performed, as necessary, by the Department's Idaho Operations Office, Headquarters program office, independent project management and cost management and cost estimating staffs and upper Department management to ensure that only work critical to the demonstration project is being performed in a cost-effective manner.

## Remedial Action Program

Question: Review briefly the current status of DOE activities to identify and implement corrective action under the Uranium Mill Tailings program?

Answer: All processing sites have been designated and priorities established in accordance with the requirements of P.L. 95-604. Designation of vicinity properties is in progress and will continue during FY 1983. Remedial actions at two vicinity properties in Salt Lake City were completed in 1981; approximately 50 additional properties in Salt Lake City and Canonsburg, Pennsylvania, will be completed this summer and fall.

Environmental analysis and documentation activities are underway at all 24 processing sites. Environmental Impact Statements and Environmental Assessments for nearly all of the sites will be completed during FY 1983. Engineering planning for the first four high priority sites (Canonsburg, Salt Lake City, Durango, Colorado, and Shiprock, New Mexico) will begin this summer, with the start of remedial actions at the Canonsburg and Salt Lake City sites scheduled to begin by October 1983 if the final EPA standards are promulgated within the next few months. One site (Canonsburg) has been acquired.

Contractors necessary to carry out the site and vicinity property remedial actions are being selected and brought on board by the Project Office in Albuquerque, New Mexico. The Project Office is also coordinating plans closely with state and Indian tribal officials. A public participation program is being pursued aggressively.

Question: Specifically, how does DOE plan to use the $4.7 million increase requested for FY 1983? (This information should clearly identify the work to be performed at each site.)

Answer: Specifically, the $4.7 million increase in the FY 1983 budget request (over the FY 1982 budget) will be used to provide the engineering designs for the remedial action at Canonsburg and Salt Lake City sites, continuation of environmental activities, completion of research and technology development efforts, preparation of detailed plans for additional high priority vicinity properties, and continuation of vicinity property remedial action work.

Remedial Action Program

On a site by site basis, the following work is scheduled to be performed in FY 1983:

- Canonsburg, Pennsylvania, and Salt Lake City, Utah: Additional vicinity properties will be cleaned up at both sites. Final Environmental Impact Statements will be issued, remedial action plans agreed with the states and NRC, engineering designs completed, and preparations completed for initiation of remedial actions on the processing sites at the start of FY 1984.

- Durango, Colorado, and Shiprock, New Mexico: Final Environmental Impact Statements will be issued, remedial action plans prepared and in coordiantion with states, Navajo tribe, and NRC, and engineering design initiated for the Durango site.

- Grand Junction, Colorado, two Rifle sites (Colorado), Riverton, Wyoming, and Gunnison, Colorado: Environmental documents will be drafted and under public review, and conceptual plans will be coordinated with the states and NRC.

- All remaining sites: Environmental documents will be completed and published.

Question: The budget includes $11.7 million for remedial action work at former nuclear processing facilities. However, the detailed justification material indicates that legislative authority will be required for about 2/3 of the sites. Could you explain, in a little more detail, the status of any required legislative action?

Answer: Thus far, 36 sites have been identified as requiring some form of remedial action and 14 sites have been authorized for remedial action. The authority is based upon clear DOE responsibility for the sites during their operation or terms of the operating contracts that provided for the Federal Government to completely decontaminate the facilities to unrestricted use after operations terminate. The 21 remaining sites are covered by the draft legislation that is currently at OMB pending administration clearance. While the contamination at these 21 sites is clearly associated with former MED or AEC operations, the responsibility is indeterminate because contacts are either not available or are silent on the issue.

Question: Is the use of any of the funds requested for 1983 for Remedial Action Programs contingent upon enactment of authorizing legislation?

Answer: No, funds requested for 1983 are not contingent upon enactment of authorizing legislation.

## Remedial Action Program

Question: What is the status of remedial action work at the Edgemont, South Dakota site?

Answer: The Edgemont, South Dakota tailings site is owned by the Tennessee Valley Authority and licensed by the Nuclear Regulatory Commission. To date no remedial action work on the site has been undertaken. The site is one of 13 commingled (privately milled as well as government milled) tailings sites recently evaluated under Section 213 of Public Law 96-540. There are about 60 properties in the vicinity of the Edgemont site which have been determined by the Battelle Pacific Northeast Laboratory to require remedial action.

Question: Is there authority for either DOE or NRC to undertake the required work?

Answer: The Nuclear Regulatory Commission FY 1982 Authorization Bill, currently in Conference Committee, provides authority for the Department of Energy to undertake remedial action at properties in the vicinity of the Edgemont Tailings Site in accordance with the EPA standards to be promulgated under Public Law 95-604 (The Uranium Mill Tailings Radiation Control Act of 1978). No funds for these remedial actions are included in current appropriations. The estimated cost is $800,000 to $1,000,000 based upon similar remedial actions at Grand Junction, Colorado.

Question: Last year the Committee was concerned with the extended delay in the formulation of standards for this cleanup work. What is the current status and schedule for issuing formal standards?

Answer: The proposed revised standards have been drafted and are currently under internal review in EPA. For the past several weeks, the DOE has been told, at staff level, that they will be released within days. An amendment of the FY 1982 EPA Authorization Act has been introduced to compel the EPA to issue the standards by June 30, 1982.

Question: What actions has DOE taken to focus top-level attention to resolving this problem as directed by the Committee?

Answer: The Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness has written to EPA's Deputy Administrator expressing a willingness to interact with EPA to accelerate the finalization of it's standards. The Secretary of Energy and the Administrator of EPA have held discussions on accelerating the process of promulgation. As a result the EPA has provided assurance at staff level that the release of the draft standards is eminent. The DOE has established a Task Force to promptly and effectively respond as soon as the draft standards are available and assist in the early promulgation so that remedial action can begin without this constraint.

## Uranium Enrichment

In your April 29, 1982, letter to me you raised a number of points. You indicate in the letter that "the justification for GCEP can be summarized quite simply: without GCEP, the United States will price itself out of the enrichment business."

Question: Basically, I am interested in why you are so certain that building GCEP will bring new customers. If the price for enrichment services is expected to have such a positive impact, please explain why the United States, which had one of the lowest enrichment prices until last year, has been unable to obtain any new foreign enrichment contracts since 1978?

Also, please explain the basis for your belief that if GCEP provides lower prices (a) the United States will be able to obtain additional foreign contracts that it was unable to obtain with low, competitive prices in the past, and (b) what is to prevent other foreign enrichers, such as EURODIF, from making a policy decision to underprice the United States after we spend $7 billion to build GCEP, as it apparently did about a year ago.

Answer: We have emphasized to all existing and potential customers that appreciable cost reductions are expected in the U.S. enrichment program by virtue of U.S. leadership in and utilization of advanced enrichment technologies. Our customers universally accept the concept that future enrichment prices will be more favorable with the incorporation of the more economical, less energy intensive centrifuge technology being installed in GCEP. This recognition by our customers of the likelihood of future SWU price reductions arising from GCEP operation as compared with gaseous diffusion could very well lead to the signing of new enrichment contracts with DOE. Since the majority of new contracts which might be available in the market in the next few years would not require initial product deliveries before 1990, and the effect of GCEP on DOE's SWU price would be evident in the 1990's, customers appreciate that over the 30-year life of the contract, they will reap essentially all of the cost advantages resulting from the GCEP technology.

Two very important facts to consider are that the number of "new" foreign enrichment contracts signed with any supplier since 1978 is very small and that price was a major factor in the few purchase decisions that have been made. Specifically, Korea signed two new enrichment contracts with Eurodif in 1980 only after obtaining a commitment that Eurodif would match DOE's price over the term of the contract. The only other new enrichment contracts signed since 1978 involved the recent enrichment contracts signed by Egypt with the U.S. This sale involved three new 30-year enrichment contracts with Egypt in addition to a contract modification of the one existing contract increasing the sales commitment by one-third. Sales from these four contracts are expected to total about $1.5 billion. Since the first deliveries are not expected to be made until the early 1990's, the role of GCEP to assure low enrichment services over the long term was a major factor in securing this sale. There are additional sales opportunities in the next few years for over 10 contracts with an annual sales value in excess of $100 million (lifetime sales would represent about $3.0 billion). These include new sales in Taiwan, Mexico and Yugoslavia in addition to follow-on contracts in the Federal Republic of Germany, Switzerland, and the Netherlands. We have been informed that price will represent a crucial element in these decisions. Future low cost enrichment from GCEP represents a valuable sales incentive in this regard.

Without GCEP, enrichment prices will be perceived by our customers and emphasized by our competitors, Eurodif and Urenco, as being significantly higher in the future. Eurodif, due in part to the weakness of the French franc, presently offers enrichment prices slightly lower than the U.S. price. They stand to realize a considerable market advantage if the potential of GCEP is not realized in the U.S. It is also significant to note that U.S. utilities have expressed a willingness to contract with Eurodif rather than the U.S. if the future economies of U.S. enrichment services do not improve. Though a detailed estimate of potential sales losses is not possible, the continued strength and vitality of a U.S. government enterprise which produces $2 to $3 billion in annual revenues, of which about one-third represents a positive contribution to the U.S. balance of payments position, is a worthwhile consideration. In this regard, the commitment to building GCEP is a major positive force.

Question: Your letter states that "Past delays in the project have only increased the cost of the facility and demonstrated the pennywise, pound foolish nature of such an approach." DOE's rationale for the FY 81 Uranium Enrichment Budget Submission to OMB apparently disagrees with your current analysis, in that it recommended a 1-year delay in GCEP at that time. Please explain why a 1-year delay in GCEP was recommended then and now delay is viewed as being "Pennywise, pound foolish."

The DOE document titled "DOE Rationale for FY 1981 Uranium Enrichment Budget Submission to OMB" indicates that for FY 1981 delay would permit another year to firm up demand before committing us irrevocably to GCEP construction." Apparently DOE also questioned the merits of GCEP construction.

What has occurred since FY 1981 that has enabled DOE to firm up demand to a point where it favors irrevocably committing to GCEP?

Answer: There have been major changes in the uranium enrichment market since FY 1981. In 1981 DOE enjoyed a sizeable price advantage over our competitors and the need for GCEP was primarily to meet demand and economics were a secondary consideration. Today DOE has lost its price advantage and there is keen competition for new foreign contracts and for maintaining our current domestic and foreign customers. In order to remain competitive we must build GCEP and use whatever capacity is not needed for demand to replace the more costly gaseous diffusion production. Any delay in GCEP would increase the cost of GCEP production with corresponding adverse marketing ramifications.

Question: Your letter indicates that "The need for GCEP continues to be supported by the results of the Department's thorough analysis***" The enclosure to your letter indicates that the analysis was based on both a mid demand of 266 gigawatts by the year 2000 and a low forecast of 231 gigawatts by the year 2000.

In light of demand studies done by TVA, NRC, GAO and others, do you still believe the 266 and 231 demand figures to be be reasonable?
Answer: We are now in the process of updating our annual forecast. Our preliminary assessment is that our new mid-range forecast for the year 2000 will be reasonably close to the GAO 217 gigawatt estimate.

Question: How much of the 266 gigawatts represent demand for which you have not signed contracts?
Answer: About 38 gigawatts.

Question: How much of the demand included in the 266 gigawatts has been cancelled since the forecast was prepared?
Answer: About 12 gigawatts.

Question: Would it be correct to say then that your 266 forecast actually overstates demand?

Answer: Based on our current perceptions, we believe the 266 gigawatt forecast is high and therefore overstates demand.

Question: Given this lower demand figure of 217 gigawatts, how do you explain using the higher 266 gigawatts figure in your analysis?

Answer: It must be remembered that our analysis was performed last year at which time we believed the 266 gigawatts to be reasonable. Our economic analysis justifying the need for GCEP also considered a lower demand and determined that the principal conclusions were unaffected. Based on a very preliminary look, we expect that our next cumulative SWU demand forecast through 2000 will be reasonably similar to the demand case used in our sensitivity analysis.

Question: At what level of demand does completing GCEP become uneconomical?

Answer: GCEP production will be less expensive than gaseous diffusion production. Hence, since GCEP can always be used to replace diffusion capacity, there is no lower limit of demand at which GCEP would remain economic.

Question: In the past DOE has indicated that GCEP could be built incrementally to meet demand. What would be the SWU cost associated with only building the first 2.2 million SWU increment? Would it be economical to only build this increment and no more?

Answer: The forward cost to complete two buildings of GCEP and retrofit with Set IV centrifuges to provide 3.3 million SWU per year capacity is $114 per SWU. This is competitive with the current out-of-pocket cost of $108 per SWU for the same capacity from gaseous diffusion plants. These costs are in FY 1983 dollars. With continued inflation, even at moderate levels, the cost of gaseous diffusion production will increase at a higher rate than production from gas centrifuge since a significantly larger portion of gaseous diffusion production costs are subject to inflation. Therefore, in a few years we would see the cost of production from the first two buildings of GCEP to be less expensive than the equivalent gaseous diffusion production. As long as there is inflation, this gap will widen. If power costs escalate faster than the general economy as it has in the past, the gap will widen even faster.

## QUESTIONS SUBMITTED BY SENATOR MCCLURE

### LMFBR Base Program-Breeder Reactor Systems

Question: (Page 16 of Testimony) - In your testimony you provide a table for FY 1982 and FY 1983 breeder reactor systems budget authority. It appears that the base program has undergone a 40 percent reduction from $376 million to $270. Is the base breeder program being reduced to provide funding to support the construction of the Clinch River Breeder Reactor? To what extent does this 40 percent reduction reflect a reduction in manpower levels at the laboratories that perform the base program research and development?

Answer: The increased funding request for the CRBR construction did affect the overall base program funding level. It was our judgment that we should proceed with deliberate speed with the construction and deployment of a demonstration sized liquid metal cooled breeder reactor power generating plant--i.e., CRBR. Thus, the CRBR funding request increase did impact on the available funding for the base program.

With the exception of the Fuels and Materials Examination Facility (FMEF) construction descoping ($13.1 million in FY 1983), the 40 percent reduction will be reflected in corresponding manpower reduction at the national laboratories and industrial contractors.

### Breeder Reactor Systems-Technology Deployment

Question: (Page 21 of Testimony) - In your testimony you state, "The private sector will make the determination when the LMFBR technology will be deployed, but such deployment will take place only when the industry feels that the government has brought the technology to maturity."

How will a shrinking base breeder program be interpreted by industry? Do you believe this will influence their confidence in the readiness to transfer the technology and implement it?

Answer: In addition to the size of the base program, the policy of the Administration in encouraging the industrialization of the commercial size breeder reactor is also significant. The three aspects of this policy are: first, completing CRBR on a priority basis; second, closing the fuel cycle thus providing the basis for an integrated light water and breeder reactor mix; and third, to institute a sensible regulatory reform to avoid unexpected and unpredictable delays thus placing the breeder industry on par with other regulated industries.

Our LMFBR base program is structured on a three-fold approach: obtain LMFBR plant operating experience, develop first-of-a-kind critical large components, and conduct R&D activities essential to the industrialization goal. The size of the base program is indeed important to industry and it provides the technology development that is beyond the industrial capability.

The contractors are aware of the need to reduce Federal outlays and are fully participating in the process of identifying those tasks essential for industrialization.

## Breeder Reactor Systems-Large Developmental Plant

Question: (Page 20 of Testimony) - In your testimony you state "A major activity that will be undertaken in concert with the private sector is an effort to develop international participation in the project so as to minimize program costs and to allow maximum utilization of international technological advances."

"If satisfactory progress is achieved in FY 1982 in development of cooperative arrangements with foreign nations and the private sector continued government support for this activity in FY 1983 will be provided." What progress have you achieved in developing a joint U.S. international participation in the development of a large developmental plant? What are the obstacles that you face? Are they monetary, political, or technical?

Answer: Significant progress has been achieved in the development of cooperative agreements with other LMFBR developing nations to allow their participation in the large developmental plant. Specifically, detailed discussions have been held on several occasions with the United Kingdom and with Japan. As a result of these discussions, we expect in the near term to execute a Special Memorandum of Agreement (SMA) with the United Kingdom that will provide the vehicle for assessing specific technical and program areas where enhanced cooperation is possible. Preliminary discussions have been held with the Japanese, and we hope that a general cooperative agreement can be executed with them prior to the end of fiscal year 1982. In parallel, limited discussions have been held with other LMFBR developing nations to determine the potential for broader cooperation.

The principal obstacles in negotiating international cooperative agreements are generally political in nature. Negotiation of detailed cooperative agreements are typically difficult and lengthy. However, the recognition of the significant potential benefits of foreign cooperation in a large breeder plant project has assisted in expediting these negotiations. Overall, the Department is pleased with the progress in the area of foreign cooperation and recognizes the significant potential for reducing overall program costs and risks that can result from expanded cooperation.

Question: Should we imply from your testimony that if you achieve satisfactory progress you will be back for a supplemental request?

Answer: If satisfactory progress is made in developing cooperative agreements with industry and other LMFBR developing nations, up to $15 million will be made available from Liquid Metal Fast Breeder Reactor base program funding, assuming that the FY 1983 appropriation for the base program is in line with the Department's request.

Question: (Page 20 of the Testimony) - You state "Highlights of this project during the last year include efforts to optimize the overall plant design and to reduce the estimated plant capital costs."

What progress have you made in reducing the per kilowatt capital cost of breeder plants?

Answer: The capital cost reductions achieved in the large developmental plant over the past year amount to $250 million. This would equate to a reduction in the per kilowatt capital cost of $250. Efforts to optimize the large plant design are continuing and further cost reductions are expected to be achieved. Furthermore, efforts to identify means of reducing the capital cost of future generation plants are continuing.

Question: What do you believe is the ultimate achievable ratio between light water reactor capital costs and breeder capital costs?

Answer: The Department's previous assessments indicated that the capital costs of a mature breeder reactor would be on the order of 1.3 times the capital cost of a light water reactor.

However, the Department is currently reassessing the likely capital cost of a mature breeder in the light of potential cost reducing design innovations which offer the potential for reducing the capital cost of the breeder to that of a light water reactor.

## Breeder Reactor Systems

Question: (Page 10 of Testimony) - In your testimony you state "The breeder reactor can provide less environmental impact than current generation light water reactors. It may be the most economical technology for supplying electricity when it reaches technical maturity and it could become a valuable source of foreign trade benefits." Describe how the breeder reactor provides less environmental impact than the light water reactors. Is this due to the reduced mining of uranium?

Answer: The greatly reduced uranium mining, milling and enrichment requirements for LMFBRs are primarily responsible for the expectation that the breeder reactor will produce less environmental impact than light water reactors. This is because breeder reactors can use depleted $UF_6$ tails, presently stockpiled at U.S. enrichment plants, and no additional uranium mining, milling or enrichment will be required. In addition, radioactivity releases and resulting environmental impacts associated with LMFBRs are expected to be smaller than those associated with comparable LWRs.

Question: It is my understanding that the capital costs for the breeder reactor on a per kilowatt basis is more expensive than that of an LWR. What features of the technology would render it the most economical of the nuclear power technologies?

Answer: LMFBR capital costs have historically been viewed as being substantially greater than LWR capital costs. These estimates were often based on essentially linear extrapolations from small and intermediate facilities to commercial size plants. An experience-based learning curve is assumed to ultimately bring "n"th of a kind plant costs down to a level of 1.2 to 1.3 times LWR unit costs. However, recent design efforts by the industry, as well as foreign design efforts, suggest that this approach has its limitations. By concentrating on cost reduction initially, plant costs in the range of 0.95 to 1.2 times an LWR are projected for mature commercial LMFBR plants. For example, in a recent paper prepared by Westinghouse and Burns & Roe staff, entitled "Approaches to Achieve

Competitive LMFBR Capital Cost," it was concluded that unit breeder costs could be only 4 to 8 percent higher than for LWRs. This was achieved by design innovations that would reduce the amount of piping, simplify major component designs, and reduce the overall volume of the plant, thus reducing the amount of steel, concrete and construction required. We believe that the technology has evolved to the point where changes in major design concepts can realistically be pursued with associated major reductions in plant cost.

The major economic incentive for the fast breeder has always been that its lower fuel cycle costs would offset the higher capital costs. The breeder would use the U-238 in depleted uranium tails stockpiled at the nation's enrichment plants. These tails stockpiles are adequate to provide electricity from the breeders for at least 500 years at current rates of consumption. The fast breeder will, therefore, not be resource dependent, and, hence, the fuel costs of the breeder will be capped. Nuclear fuel costs will not be determined by the costs of a scarce resource, uranium, but by the process costs of the nuclear fuel cycle. The long-range strategy of U.S. energy policy for nearly a decade has been to move toward long-term energy supplies that are inexhaustible and not resource dependent. The breeder is one of those essentially inexhaustible energy sources. Since the breeder will have lower fuel cycle costs than LWRs, and since mature breeders are expected to have capital costs comparable to LWRs--we believe that fast breeders will be economically attractive to utilities essentially independent of other longer-term considerations such as the price of uranium.

Question: (Page 12 of Testimony) - In your testimony you state "The breeder requires much less mining and transportation than coal fired plants and would not release fossil fuel emissions into the atmosphere." On a per plant basis of 1000 megawatt size, how much less mining and transportation would be required for a breeder reactor versus a coal fired plant?

Answer: Virtually no mining of fuel materials would be required for a 1000 MWe LMFBR. About 700 acres of land would be strip mined annually to meet the needs of a 1000 MWe coal fired plant. Shipping this coal requires a unit train nearly every 3 days. A 1000 MWe LMFBR and its supporting fuel cycle would require about 62 rail shipments and about 84 truck shipments annually.

Question: Compare on a per plant basis the quantity and toxicity of releases to the atmosphere for coal fired plant and a breeder plant. Discuss the uncertainties associated with the environmental impacts of the emissions for each plant.

Answer: A typical new 1000 MWe coal fired plant would release the following quantities of air pollutants annually.

Particulates - 500 to 1100 tons
Sulfur Oxides - 7000 to 26,000 tons
Nitrogen Oxides - 11,500 to 18,500 tons

The coal fired plant would also release carbon monoxide, carbon dioxide and toxic trace metals (beryllium, cadmium, mercury, nickel, lead, uranium, etc.).

The typical 1000 MWe LMFBR powerplant would release about 200 curies of tritium and noble gases annually, significantly less than released by a typical LWR. Reprocessing of either LWR or LMFBR fuel would entail a release of about 150,000 curies of tritium, 12,000 curies of krypton-85 and about 1 curie of particulates (mixed fission products and transuranics) from its supporting fuel cycle.

It is not possible to compare the toxicity of these releases, because quantitative information is not available for calculating most health effects. Increased mortality for a 1000 MWe coal fired powerplant is estimated to be from 1 to 140 deaths annually (due to air pollutant releases). Releases of radioactivity from a 1000 MWe LMFBR and its supporting fuel cycle are estimated to eventually cause about 0.1 additional cancer deaths annually.

## Advanced Nuclear Systems - Space Applications

Question: (Page 45 of the Testimony) - In your testimony you state "Coordination with NASA and DOD is now underway with a view to establishing an expanded tri-agency program with the DOE as the lead agency responsible for technology and development of the space reactor subsystem."

Are the negotiations that are underway in any way impacting the technical work ongoing in the program because of either uncertain technical goals or reduced levels of funding?

Answer: As you are aware, NASA in FY 1981 pledged $700,000 to be transferred to DOE to support the space reactor development program underway at the Los Alamos National Laboratory. The transfer of these funds has been withheld by NASA pending the resolution of a satisfactory interagency and/or tri-agency agreement. Because the Department's funds of $1,300,000 will be expended by May 31, 1982, we have notified NASA that unless a commitment is received by May 18, 1982, the Department will unfortunately have to take measures to proceed with program termination activities immediately.

Question: Are there any other alternate systems that either NASA or DOD is considering that could or would perform the function to be served by these space power reactors for missions in the 90's?

Answer: While the advanced space reactor power system, if developed, could provide an enabling power technology for both NASA and DOD future missions, neither agency has dismissed the use of the conventional solar array/battery power system as a fall back alternative, even though a number of vital mission objectives might have to be relinquished.

Question: Are there any recommendations that you can make to us that would require legislative remedies to assure the orderly continuation of this program?

Answer: The continued subcommittee support of the advanced space reactor program under DOE cognizance would help to assure the orderly continuation of this program.

## Reprocessing

Question: (Page 5 of the Testimony) - In your testimony you state "We have been instructed by the President to identify regulatory barriers to commercial reprocessing and to develop recommendations on how to create a more favorable climate for private reprocessing efforts. In carrying out this directive we have found not only regulatory barriers but also a number of institutional and economic uncertainties that are impediments to commercial reprocessing." Can you give us a preview of the specific recommendations for government action that you believe will allow the private sector to move forward in this area?

Answer: Because details of our recommendations are still under internal review, it would be premature to discuss them publicly at this time. We can state, however, our general conclusions that actions are necessary to financially protect a reprocessor against possible future policy changes, to resolve regulatory barriers, to assure a market for plutonium for the breeder program, and to resolve issues concerning the form and timing for Government acceptance of wastes. Further, we believe such actions are feasible and we are optimistic that, when implemented, they will in fact significantly improve prospects for commercial reprocessing. Our optimism is supported by at least one element of the private sector. In a paper presented March 23, 1982, at a conference sponsored by the Atomic Industrial Forum, Mr. Ashton J. O'Donnell, Vice President, Bechtel National, Inc., stated "assuming continuing favorable progress within the Administration, it is reasonable to anticipate a sound basis for proceeding with reprocessing in the private sector."

We shall be pleased to share with you the details of our recommendations as soon as they are finalized.

## Commercial Waste Management Program - Utility Fees

Question: (Page 47 of the Testimony) - In your testimony you state "The budget request for FY 1983 is $80.5 million supplemented by borrowing authority of $185 million as compared to $210 million in FY 1982. The $185 million in borrowing authority is necessary until utility fees are received to finance the project specific waste management activities." Do you believe this level of borrowing authority is sufficient in the light of the potential delay in implementation by state regulatory authorities of the necessary collection structure after passage of the enabling legislation?

Answer: Yes. The initiation of payments of disposal fees by the utilities to the government does not depend on state regulatory action. Each utility with nuclear powerplants will be expected to make the appropriate payments, regardless of the utility's particular existing rate structure or planned rate requests. Most utilities have already recognized the need to collect funds to cover waste management costs. Many have approved rate changes to

Commercial Waste Management Program - Utility Fees (continued)

cover these expenses, while others have pending rate requests. The Deparment expects to provide a reasonable period of time from passage of enabling legislation to the time when payments to the Government will begin. This period will provide some additional time for utility rate actions associated with waste disposal.

Question: What programmatic impact would occur from a delay in the collection of these utility fees?

Answer: The requested borrowing authority provides sufficient funds for FY 1983 activities. A programmatic impact would only occur if fee collections were delayed until FY 1984. However, the proposed legislation and current Department planning provide for fee collection in FY 1983.

Remedial Action Program - Formally Utilized Sites
Remedial Action Program

Question: (Page 56 of the Testimony) - In your testimony you refer to the final cleanup and disposal of the waste from the contaminated properties in New Jersey. You state "Several disposal options are being studied including use of other Federal sites, establishing a new state-owned site possibly in conjunction with a state or regional or low-level waste site, or disposal under EPA permit at an Atlantic Ocean site." What efforts does the Department have underway to the ocean dumping of low-level wastes. I understand that the Department has funded at a low level the possibility of subseabed disposal of high-level waste. Is the Department pursuing the possible disposal of low-level waste in a similar fashion?

Answer: The Department of Energy is funding a small effort for study of the feasibility of the ocean disposal of material contamianted with trace levels of natural radioactivity (uranium ore residues) located at Middlesex, New Jersey. The material consists of soil and rubble from the cleanup of the Middlesex Sampling Plant and vicinity properties contaminated during or subsequent to the Manhattan Engineer District activities conducted for the Atomic Energy Commission during World War II. These are actually byproduct material and are not low level waste in the strict sense of the definition of that term. The Department is not pursuing the possible disposal of low-level waste in a manner similar to the subseabed disposal of high-level waste.

Remedial Action Program - Grand Junction Program

Question: (Page 57 of the Testimony) - In your testimony you state "The cleanup of remaining sites under the program is tentatively scheduled to be completed by 1985 and finally certified by 1987, but the pace of the program is currently dependent on the State of Colorado providing its share of the funding." What type of funding problems is the State of Colorado having in terms of coming up with its share of the funding?

Answer: Generally, the State of Colorado has not had a funding problem related to the Grand Junction cleanup. The expectation is that the program will be essentially completed by 1985, with final certification to be accomplished by 1987.

Question: What types of problems are you having with the states in terms of executing the cooperative agreements required for the uranium mill tailing program?

Answer: We have encountered two types of problems. The first concerns the state agreement execution which has been accompanied by questions regarding whether the state legislatures would appropriate the 10% funding needed to fulfill the agreement requirements for the program costs within a state.

The second, relates to the State's concerns about the DOE's authority in decisionmaking (not enough control at the state level).

Remedial Action Program - Surplus Facilities Management Program

Question: (Page 60 of the Testimony) - In your testimony you state "Preliminary engineering and planning for the decontamination and decommissioning of the Shippingport Atomic Power Station will be completed in FY 1982." Can we expect that this project will be the first large-scale demonstration of the decommissioning efforts required for a light water reactor of significant size?

Answer: The planned decontamination and decommissioning of the Shippingport Atomic Power Station will demonstrate for the first time many of the techniques needed for decommissioning large-size light water reactors. The current plan is to remove the reactor vessel, internals and neutron shield tank without segmenting them and shipping the assembly intact by barge to a burial site at Hanford or Savannah River. This one-piece vessel and internals removal will be applicable to commercial power reactors and may also be a basis for utility analysis of the repowering (that is, vessel replacement) option. One-piece removal has never been demonstrated and should result in considerable cost and schedule savings in future reactor decommissioning work whenever this technique can be used.

## Remedial Action Program - Surplus Facilities Management Program

Question: Can you tell us at this time how long this process will take and how much it is expected to cost?

Answer: The present plan is to begin the decontamination and decommissioning as a capital project in FY 1984 and complete the project three years later in FY 1987. The estimated project cost is $60 million in 1984 dollars.

## General

Question: (Page 8 of the Testimony) - In your testimony you state "Resumption of a leadership role in advanced technology such as the breeder and reprocessing will enhance our influence in international technical, political, and economic developments as well as our ability to influence world non-proliferation strategies. The availability of advanced technology coupled with renewed efforts to demonstrate the attractiveness of U.S. products on the world market scene should substantially increase our viability in foreign commerce." To what extent do you believe that the politicizing of nuclear technology in some of our non-proliferation efforts have reduced both our leadership role and the attractiveness of our products in the world marketplace?

Answer: The extent of our reduced leadership role is evident both by the number of arrangements being made in the energy field with Eastern Bloc countries by Western Europe and by the growing independence in the nuclear field of many of our former or potential partners that had referenced U.S. nuclear technology in the past.

The attractiveness of our products has been reduced by our inability to provide reliable fuel cycle services to the potential nuclear reactor buyer. To buy a reactor from an American vendor leaves the customer with the added problem of conforming to elaborate restrictions that are not imposed by other suppliers such as arranging for the reprocessing of his spent fuel. The extent of this impact is demonstrated in the reduced orders for reactors from U.S. vendors, severe competition in the market and increases in foreign orders for enrichment services from foreign suppliers.

A summary of the results to date of politicizing reprocessing policies also helps illustrate how U.S. leadership has been affected. In 1977, President Carter deferred domestic commercial reprocessing indefinitely in the hope that this example would assist non-proliferation efforts. Since 1977, however, it has become clear that other countries intend to proceed with reprocessing regardless of its fate in the United States, indicating that the unilateral U.S. prohibition of domestic reprocessing did little to advance our nonproliferation objectives relative to other countries. Other countries, not having indigenous uranium resources and not capable of economically justifying an indigenous enrichment capability, continue to view their spent fuel as a valuable commodity and are seeking reprocessing services to realize this value. In the meantime, the U.S. has lost its ability to offer such services for at least another eight to ten years at the earliest, and foreign countries have now gained a leadership position in this field.

## Uranium Enrichment - Advanced Isotope Separation

On page 72 of your testimony you indicate that your budget request for the AIS program is approximately $50 million less in FY 1983 than in FY 1982. You indicate that operation within the reduced budget is possible by selecting one of the three processes.

Question: It is my understanding that within the last several weeks you have selected one of the three competing processes. Can you tell us the basis for your selection for this process, and when do you believe this process will be brought from the laboratory to the production module stage?

Answer: To provide a basis for selection, criteria were developed by the AIS Program Office with assistance provided by staff of the laboratories participating in the AIS program. These criteria were issued on August 13, 1981.

Using this document as a basis, the Process Evaluation Board (PEB) focused on answering the following questions:

- What are the prospects for successful engineering development?
- Is the technical base adequate to proceed to the next step in process scale-up?
- Do the projected economics of the technology meet the AIS program goals?
- Is there sufficient flexibility within the technology and in the design of large facilities sufficient to overcome potential problems?
- Does the proposed Development Module provide adequate confidence that will enable DOE to commit to the deployment of the technology?
- Are the program plans, schedules, and costs realistic?

The PEB conducted its assessment by visits to the various participating laboratories and by requiring the participants to submit detailed information concerning such things as the fundamentals of the process, preconceptual design reports, economic assessments, etc. A vital ingredient of the process selection was a "Peer Review" in which each participant critiqued the other two processes in an open forum. Such a technical exchange provided in-depth reviews of the scientific and engineering status of each program using adversary procedures.

The PEB established a framework within which it assessed the four major evaluation categories. The following is a description of this framework:

1. Performance Risk

   - Evaluation of the status of the experimental program and where major uncertainties still exist.

- Evaluation will be relative to proposed plant and development module designs.
- Process science models exist which have been benchmarked to the degree necessary to reasonably predict scaling relationships.
- Impacts of uncertainties were evaluated by varying the parameters used in the economic assessments.

2. Engineering Design

The basis for the evaluation was the completeness and depth of engineering design.

3. Economic Benefits Evaluation

The role of the PEB in the Economic Benefits section was to place reasonable bounds on (1) the future development cost of the AIS program, (2) the projected AIS SWU costs, and (3) the technology deployment date.

4. Technology Development Plan

In this category the PEB evaluated the:

- program plans
- management teams
- engineering and development costs
- program schedules
- flexibility of the process to meet varying product assays
- development of an industrial vendor base

Using these criteria as a base, the Atomic Vapor Laser Isotope Separation process was selected for large scale engineering development and demonstration.

The engineering development phase of AIS would conclude with the operation of a Development Module (DM) by the late 1980's. The DM's main objective is to resolve any remaining process physics or subsystems integration performance issues at full plant scale. Successful competion of the DM phase of the program could lead to production deployment in the mid to late 1990's.

Question: Given the fact that you appear to be taking the program from the pure science stage to one of engineering development, can we be sure that the level of funding that you have requested will result in the timely development of this technology?

Answer: The critical path in development of the selected Atomic Vapor Laser Isotope Separation (AVLIS) process is the resolution of the technical issue associated with the operation of the uranium collector system. The funding requested for FY 1983 should be sufficient to provide the data needed to allow the start of the design of the Development Module (DM) in FY 1984. It is the information that is obtained thru the operation of the DM that will permit the establishment of a firm cost and schedule for the production deployment of the AVLIS technology.

### Uranium Enrichment - Long Term Strategy

On page 63 of your testimony you state "In FY 1983 the complex will operate at the same power levels as in FY 1982. These levels represent an acceptable level of risk of equipment failures from prolonged operation below plant design levels."

Question: At what fraction of the total enrichment capacity is the installed plant currently operating at?

Answer: In FY 1983 the installed capacity of the gaseous diffusion complex will be 27.1 million SWU/year. Planned production is 9.8 million SWU or 36 percent of the installed capacity.

Based on the current contract power levels, maximum production in FY 1983 would be 16.9 million SWU. The planned production of 9.8 million SWU would be 58 percent of the maximum production from the power contractually available.

Question: How long can you continue to operate the plants safely at these levels.

Answer: FY 1983 will be the third successive year that the gaseous diffusion complex will operate at a load of 2660 megawatts. The 2660 MW level was picked in 1978 at a time when a smaller percentage of CIP/CUP equipment had been installed. Because of continued installation of CIP/CUP equipment and an ongoing program to identify the minimum acceptable risk power level, we have now identified a minimum power level of 3190 MW beginning in FY 1984. Operating below the minimum power level of 3190 MW, which is the minimum level recommended by the operating contractor of the diffusion, represents assuming an unnecessary operational and equipment risk.

Question: What type of equipment failures do you expect could occur from the prolonged operations below plant design levels. Would these equipment failures result in an overall degrading of the reliability in the future of the enrichment complex?

Answer: Modifications to the complex's instrumentation and control systems have been made to facilitate operations at reduced power levels. As a result, the complex has so far not experienced excessive in process equipment failures or safety threatening incidents that are directly attributable to low power operation. However, since low power operations were installed in FY 1981, the plants have experienced severe deterioration of the process cooling towers which will require millions of dollars of repair. These towers must be rebuilt to provide continued operation of the plants.

Cascade control, although sluggish, is being maintained. A production penalty of about 4 percent is being incurred in order to control the cascades. Solidification of the process gas ($UF_6$) has occurred from time-to-time because of reduced temperatures in sections of process piping. These deposits of solid $UF_6$ are vaporized by using externally applied heat.

## Uranium Enrichment - United States Competitive Position

On page 64 of your testimony you state "The United States position in the non-United States market has declined from a 100% share in 1974 to about a 35% share today. A number of our foreign customers have switched from the United States to Eurodif, Urenco, and the Soviet Union and some new business has gone to the suppliers."

Question: To what forces do you attribute the decline in the United States market share in the world enrichment business? For example, technical reasons, non-proliferation policies, security of supply, economics, a capacity on the part of the U.S. to use enrichment services as a political tool.

For the record, identify each customer that has switched from the United States to another supplier of enrichment services. This discussion should include those reasons specified by the customer for cancellation of the contract as well as the value of the contract and the cost of the new service that was procurred by the customer.

Answer: The dramatic decline in foreign sales of U.S. enrichment services may be attributed to a combination of factors, including the emergence of foreign enrichers who did not exist in 1974, supply diversification needs, supply assurance, the implementation of U.S. non-proliferation policies, national goals and policies, etc.

A description of those customers who have switched from the U.S. to alternative enrichment suppliers to the present time is shown in the following table.

Loss of Existing U.S. Enrichment Contracts

| Country | Utility | MWe | Contract Value ($M) | Alternative Supplier | Reason |
|---|---|---|---|---|---|
| W. Germany | RWE | 1,150 | 214 | Urenco | Supply Assurance/ National Program |
| W. Germany | EVS/ Badenwesk | 864 | 75 | Urenco | " |
| W. Germany | Prussian Electric | 640 | 105 | Urenco | " |
| Spain | Seville Electric | 926 | 92 | Eurodif | Support Existing Market Commitment/ Diversification |
| Sweden | OKG | 902 | 120 | USSR | " |
| Switzerland | NOK | 350 | 21 | Urenco | Supply Diversification Attractive Price & Flexibilities |

The cost of the alternative enrichment services that were procured by each of the above customers has not been made known to us.

## Uranium Enrichment - Price Advantage

On page 65 of your testimony you state "Last year the United States enjoyed a price advantage of $30-50 per SWU. Since then the United States price increased by $20. The competitors have reduced their price and fluctuating exchange rates have further reduced our competitors' prices."

Question: Given the age of our enrichment complex, even when considering the $1 billion that was spent on the recent upgrades, it would appear that we would enjoy a natural pricing advantage given the recent cost of constructing new enrichment plants for our foreign competitors. To what extent do you believe that the foreign governments are subsidizing the costs of these reduced SWU prices.

Answer: The age of our enrichment plants has advantages and disadvantages in establishing our price. The plants were built in the 1940's and 1950's at costs significantly less than the cost of construction of the new plant constructed by Eurodif. The depreciation of our diffusion plants make up only about 5 percent of our selling price. On the negative side, the age of our plants requires extensive maintenance and replacement of old structures and equipment.

In determining our selling price, the two critical items are the cost of power and financing costs, both of which have accelerated greatly in the last few years. We believe these two items are also the major cost elements of our competition, particularly Eurodif. The other significant factor is the foreign exchange rates. In the last two years the French Franc has lost about one-third of its value which has given Eurodif a price advantage over our price.

While we do not have concrete information, we do believe that foreign governments are subsidizing their price. We do know that Eurodif has offered lower prices to new customers than they offer their equity partners. Also we feel that Eurodif's costs have increased at a rate faster than their prices have increased.

Question: To put the issue of SWU price into perspective, please provide information for the record that indicates the sensitivity of the busbar cost of electricity to varying the price in the SWU cost. Provide these numbers based upon the capital costs of plants that were built in the early 1970's, late 1970's, early 1980's, and late 1980's.

Answer: The cost of electricity at the generating plant increases about 1/4 mill per kilowatt-hour (Kwh) for each $10 per SWU increase in enrichment cost. This is true regardless of the capital cost of the nuclear plant. According to surveys conducted by the Atomic Industrial Forum, the busbar generating cost for nuclear stations, including capital charges, fuel costs, and operation and maintenance costs, was 23 mills per kwh in 1980, of which 2.4 mills per Kwh was contributed by the enrichment cost, and 15 mills per Kwh in 1976, of which 1.5 mills per Kwh was due to the enrichment cost.

## Uranium Enrichment - Competitive Position

On page 65 of your testimony you discuss the steps that the uranium enrichment program is taking to minimize the current and future selling price by reducing operating costs. You go on further to state that these efforts are beginning to produce results, in particular you refer to a recently signed letter of intent with Egypt for the sale of one new uranium enrichment contract and increased sales commitment of an existing contract.

Question: Are you aware of who the other competitors were in this procurement?

Was our ability to obtain the contract with Egypt the result of the economic attractiveness of our offer or rather the result of the enrichment of our political ties with that country?

Answer: Recently, we finalized negotiations on a larger sale than originally specified in our letter of intent with Egypt. In fact, Egypt recently signed three new 30-year enrichment contracts with the U.S. in addition to a contract modification of the one existing contract increasing the sales commitment by one-third. Sales from these four contracts are expected to total about $1.5 billion. Since the first deliveries are not expected to be made until the early 1990's, the confidence that low prices for enrichment services from the U.S. over the long term (due in part to the role of GCEP to keep prices down) was a major factor in securing this sale.

Cogema had been discussing the possible sale of Eurodif enrichment services with Egyptian authorities. To our knowledge, they were the only active enrichment supplier competing for the Egyptian sale.

## State of the Domestic Uranium Producing Industry

On page 73 of your testimony you state "The United States uranium industry faced a difficult situation. The industry has overbuilt production capacity and must reduce production in order to be in better balance with demand. The adjustments must be made primarily because of the reductions in uranium demand and falling prices resulting from nuclear power reactor construction delays, cancellations, and lack of new reactor orders."

Question: Given these observations with respect to the uranium mining industry, how do the similar observations apply to the demand on our uranium enrichment complex?

Answer: They are exactly parallel. We find ourselves today with excess capacity, large inventories and the need to reduce near term production in order to be in better balance with demand.

## Uranium Enrichment - Privatization

On page 9 of your testimony you state "Based on the viability of our operations there have been suggestions over the years that enrichment activities be transferred to the private sector. We are currently evaluating the option and identifying appropriate procedures should a decision be made to transfer enrichment activities to private industry.

Question: To what degree are you considering the potential impact of NRC licensing the privatized uranium enrichment activity? Based on the NRC impact on the nuclear industry as a whole it would appear that the financial impact could be devastating.

Answer: The impact of the NRC cannot be fully determined at this time. It will be based primarily on two factors: 1) the form and composition of the "private" entity or entities which follow and 2) the requirements of privatization legislation. The ultimate form of the industry will depend on negotiations with potential operators and will be subject to Congressional oversight. Certainly, a primary topic of the negotiations and discussions will be the nature and extent of NRC licensing requirements.

Question: What level of interest has industry recently expressed in taking over the enrichment complex as a private enterprise activity?

Answer: There has been no formal expression of interest from the private sector. It is our intention to seek the views of private industry before any final recommendations are made.

## QUESTIONS SUBMITTED BY SENATOR SCHMITT

A proposal to establish a consistent national minerals policy that is supported by accurate data and a broad base of technological information concerning exploration, resources, production materials properties, conservation and stockpiling is currently being circulated among members of Congress, industry and government. I understand that DOE has had some informal input.

Question: In light of the President's minerals policy, shouldn't the DOE pursue some sort of national interdepartmental program on strategic materials and indentify where and how technological solutions would fit into such a program? Could the Grand Junction office contribute its expertise to such an effort?

Answer: It is difficult for the Office of the Assistant Secretary for Nuclear Energy to comment on whether the DOE should pursue a strategic minerals program and how technical solutions would fit into such a program. However, the people at the Grand Junction Area Office and the operating contractor, Bendix Field Engineering Corporation, have a considerable expertise in assessing and evaluating mineral resources since they conducted the very successful National Uranium Resource Evaluation Program.

Question: How many uranium producers remain? What production capacity now exists? How much foreign uranium was purchased for U.S. use in 1981? To date in 1982? Do you have any figures on mine worker lay-offs?

Answer: There are 32 uranium processing plants operating at this time that produce uranium concentrate, that is $U_3O_8$. Eighteen of these are conventional plants that process ore that has been mined. The other 14 non-conventional plants process uranium bearing solutions. The solutions are derived from in situ mining for uranium, or from phosphate or copper leach processing. These 32 plants have the capacity to produce about 15,500 short tons of $U_3O_8$ per year. In the past 12 months, 6 conventional plants and 4 non-conventional plants have been shutdown. These plants had a total nominal capacity of 5,000 tons per year.

Based on DOE's latest survey of U.S. utilities with nuclear reactor projects, U.S. reactor manufacturers and U.S. uranium producers, 2,200 short tons of $U_3O_8$ were purchased for U.S. use in 1981 and 2,500 tons are scheduled to be purchased in 1982; these amounts do not include settlements of litigation since these settlements are not considered purchase arrangements.

From 1979 through 1981, it is estimated that 5,000 employees engaged in uranium mining and milling and approximately another 2,000 in exploration, were laid off. In addition, 1,200 employees have been laid off in 1982 due to further shutdown or curtailments. Currently industry employment is about 11,000, including exploration and land acquisition specialists.

Question: What is the Department's statutory duty under Section 161v of the Atomic Energy Act? What affirmative duties is the department required to take if the industry is not viable?

Answer: As provided by Section 161v of the Atomic Energy Act of 1954, as amended, the Department "to the extent necessary to assure the maintenance of a viable domestic uranium industry," shall not offer its enrichment services for uranium of foreign-origin intended for domestic end use. If the industry were not viable the Department would revise the schedule that removes the restrictions on the enrichment of imported uranium for domestic end use.

Question: What steps is the Department prepared to take to fulfill its obligation under section 161v "to assure the maintenance of a viable domestic uranium industry"?

Answer: When the plan for the removal of restrictions on enrichment of foreign uranium was announced in 1974, the Atomic Energy Commission (the predecessor agency to the Department of Energy) announced that it would "monitor the extent of importation of foreign uranium for domestic use and its effect on the viability of the domestic uranium producing industry." As long as there is a Uranium Resource Assessment Program within the Department, these activities will be continued.

Question: Which agency will be responsible for assessing the viability of the industry if the Grand Junction Office is closed?

Answer: At this time there is no plan to continue monitoring the viability of the uranium producing industry because there are adequate resources available in the U.S. to support nuclear growth into the next century.

Question: Although the DOE no longer operates the enrichment plants in the "split tails" mode, the problems created by that program continue to this day. By continuing to sell enriched uranium produced through the "split tails" mode, rather than the tails assay now in effect, DOE is continuing to sell off the stockpile and reduce the feed required from enrichment customers. Why not use the current transaction rate and thereby keep the stockpile at its present level, and not reduce feed requirements, as many producers have suggested? Also, why not extend the "variable tails assay option" to all enrichment contract holders? If enrichment utility customers were given the choice of tails assay and allowed to adjust the separative work purchases to be consistent with his tails assay choice, the customer could choose the tails assay that minimized his overall cost of nuclear fuel and this would be passed on to consumers.

Answer: Let us first consider some background information. In 1972, the U.S. Government declared that a portion of its uranium inventory, then estimated at around 50,000 short tons $U_3O_8$, was surplus to projected Government requirements. Various alternatives were considered to dispose of the surplus inventory. The Government rejected the option of explicit sales because of the adverse impact such sales would have on the domestic mining industry.

An alternative use of the surplus uranium was developed to avoid competition with domestic producers and the associated impact on the market price structure. This is possible because natural uranium can, to some extent, be used as a substitute for uranium enrichment services. From July 1972 to October 1978, the operating tails assay of the enrichment plants was increased while leaving the transaction tails assay unchanged. When the operating tails assay is greater than the transaction tails assay, the situation is called "split tails" operation. The transaction tails assay determines the amount of enrichment services an enrichment services customer must purchase from the Government, and the amount of natural uranium the customer must purchase from the mining industry and deliver to the Government's enrichment facilities. By leaving the transaction tails unchanged, the Government did not change the need for uranium at the enrichment plants. Indeed, the transaction tails assay has remained at 0.20 percent U-235 since the Government began offering enrichment services in 1969.

At the higher operating tails assay, the customer-provided uranium was insufficient to produce the enriched uranium required by the customer. The Government provided the additional uranium from its surplus stocks and the enrichment customer was charged for this uranium through the payments for enrichment services. The Government, in effect, substituted some uranium for separative work. This method of operation was discussed during Congressional hearings in March 1972. Congress had no objection to the split tails operation.

Since the mid-1960's, the Government has preproduced enriched uranium by using available excess separative work capacity and using its own stockpile of natural uranium. Preproduction occurred during years when the tails assays were the same (often called "unified tails" operation), as well as during the years of split tails operation. The preproduction of enriched uranium was undertaken because long-range economic studies indicated it was less expensive to produce the separative work in the near-term from the existing plants than to produce it in the long-term from new plants.

The Government's stockpile of enriched uranium is contained in cylinders in the form of $UF_6$. Currently, some cylinders contain enriched uranium that was produced during unified tails operations, while others contain enriched uranium produced during split tails operations. The Department's nuclear materials management system maintains records for each cylinder to reflect whether the enriched uranium was produced during unified tails or split tails operations.

In order to save budget costs, electric power purchases to operate the gaseous diffusion plants have been reduced, thus reducing the separative work output of the plants. In order to provide the enriched uranium required by enrichment services customers, some of the enriched uranium from the Government's stockpile must be used, and will be taken from cylinders produced during unified tails, as well as split tails operations. The Department's accounting system records a transaction for natural uranium usage only when a cylinder is used that contains enriched uranium produced during split tails operations. As noted earlier, some of the Government's natural uranium is still in the stockpile of enriched uranium produced during split tails operations. Therefore, some of the natural uranium consumed during split tails operations has not yet been recorded as a transaction. At the current rate of enriched uranium usage, we expect some of the Government's uranium from split tails operations to be recorded as a transaction over the next 5 to 10 years. However, the accounting treatment does not in any way affect the quantity of Government owned uranium now being fed to the enrichment plants to meet Government requirements nor the amount of natural uranium that enrichment services customers currently bring to the enrichment plants. DOE is not "selling" uranium but is only accounting for material used during past production of an enriched uranium inventory in the July 1972 to October 1978 period.

Regarding the question on providing the "variable tails assay option" to all customers, the holders of DOE's Adjustable Fixed-Commitment (AFC) contract can choose the variable tails assay option within the terms of the contract. Other customers hold DOE's Long-Term Fixed-Commitment contract or Requirements-type contract. The holders of these contracts can convert to the AFC contract free of charge at any time. Thus, if it is important to one of these contract holders to be able to select his own tails assay, there is a no cost mechanism available to him.

Question: What is your response to the industry charge that the practical effect of the split tails policy is that the government has sold 35 million pounds of uranium from the stockpile? Why is the government disposing of its uranium surplus in a time of slack demand?

Answer: The Department's enrichment plants operated on a split tails mode from July 1972 to October 1978. To date the Department has recorded sales of 30 million pounds.

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## Taxation in Connection with DOE Contracts

Question: A recent Supreme Court decision, United States v New Mexico, held that the Sandia Corp. and the Zia Company are liable to state taxation in connection with operations under their DOE contracts. Also now final is the decision of the Tenth Circuit Court of Appeals that the United States Government is the real party in interest in any administrative proceedings necessary to determine the tax liabilities of these contractors. What specific steps is the DOE taking to carry out the decisions cited?

Answer: Attorneys for DOE and its contractors, Sandia Corporation and Zia Company met with representatives of the New Mexico Taxation and Revenue Department on May 7, 1982, to discuss the course of action to be pursued in calculating and assessing Zia, LACI and Sandia for tax liability. While the Department is committed to a prompt resolution, a realistic assessment indicates that this meeting is the commencement of a process which may take some months to complete. It should be noted that the tax liability will be retroactive to 1970 and may require audits of the contractors by the New Mexico Taxation and

Revenue Department. Questions must be resolved on a number of matters, e.g., what constitutes taxable receipts, what deductions may be applicable, and what purchases by the contractors may be entitled to tax fee treatment. DOE would prefer to see all questions resolved at the outset to avoid a piecemeal approach to funding requests.

Question: After a figure is determined, what vehicle for payment will the Department utilize?

Answer: DOE has not yet reached a decision in this regard. However, since retroactive liability may exceed $100 million dollars a supplemental appropriation is likely to be sought at least for that portion of the tax liability. While the method of obtaining funds for prospective tax liability is still under consideration, one alternative seems to be to include such funding in a supplemental appropriation request. Another alternative could be to reduce contractor activities through contractor reduction in force or otherwise in order to decrease program costs in an amount which will permit contractors to meet tax liabilities.

Question: Could you provide a timetable of the steps contemplated?

Answer: In view of the foregoing, DOE has not established even a rough time table. Another meeting with State revenue officials will probably be scheduled for early June. We will be pleased to advise you further when more definite answers can be supplied.

Question: What does the Department plan to do with the Space Power Advanced Reactor Program?

Answer: The overall Space Power Advanced Reactor Program is now called the SP-100 Project. The objective of the first phase is to identify critical technologies of an advanced space nuclear reactor power system which require further development. Two major milestones are planned for this phase. The first milestone is to complete a preliminary technology review in about 18 months. This review will attempt to match technology status against specific application needs. The second milestone is to decide whether to proceed with a ground engineering system. This decision would be made in the 1986-87 time period. The current plan is to complete the ground engineering phase in the 1989-op time period and a flight application pghase in the 1990's. In view of the interest expressed by the National Aeronautics and Space Administration (NASA) and the more recent interest indicated by the Defense Advanced Research Projects Agency to participate in and support this program, a tri-agency program supported by the Department, NASA, and the Department of Defense appears most appropriate with equitable funds provided by all three agencies.

Question: Should this program be placed under one agency?

Answer: The Department of Energy (DOE), like its predecessors the Atomic Energy Commission (AEC) and the Energy Research and Development Administration (ERDA), has the responsibility as the Government's lead agency for research and development on space nuclear power. Over a 20-year period, the agency has developed a unique laboratory and contractor system with a staff of experts who have demonstrated their ability to develop space nuclear power systems.

DOE and its predecessor agencies have demonstrated their capability to build nuclear reactors for power production in remote terrestrial areas and in space. The space nuclear staff has also successfully managed the nuclear heat source and power conversion production activities for the radioisotope thermoelectric generators used on 22 NASA and DOD spacecraft. The only U.S. space nuclear reactor power system was also successfully developed by the nuclear agency. These accomplishments demonstrate DOE's managerial and technical expertise in space nuclear power.

Accordingly, DOE has proposed establishing a project office with the user agencies (e.g., NASA and DOD). This office would provide the overall coordination and management of the technology development efforts. Uder this project office, DOE would manage and coordinate the nuclear reactor subsystem and the power conversion subsystem efforts with funds provided by DOE, NASA, and DOD.

As you are aware, in the case of the previous space nuclear rocket propulsion program, a joint AEC/NASA office was organized within the AEC to manage and direct that work. Similar joint office organizations established within the nuclear agency are not uncommon and have proven to be a successful management structure as evidenced by the Army Nuclear Power Program, the Maritime Nuclear Propulsion Program, and the Naval Reactors Program.

## SUBCOMMITTEE RECESS

Senator McClure. Thank you very much.

The subcommittee stands in recess subject to call.

[Whereupon, at 3:55 p.m. Thursday, May 13, the subcommittee was recessed to reconvene at the call of the Chair.]

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